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DEPARTMENT OF DEFENSE AUTHORIZATION FOR APPROPRIATIONS FOR FISCAL YEAR 1985

HEARINGS

BEFORE THE

COMMITTEE ON ARMED SERVICES
UNITED STATES SENATE

NINETY-EIGHTH CONGRESS

SECOND SESSION

ON

S. 2414

TO AUTHORIZE APPROPRIATIONS FOR FISCAL YEAR 1985 FOR THE ARMED FORCES FOR PROCUREMENT, FOR RESEARCH, DEVELOPMENT, TEST, AND EVALUATION, FOR OPERATION AND MAINTENANCE, AND FOR WORKING CAPITAL FUNDS, TO PRESCRIBE PERSONNEL STRENGTH FOR SUCH FISCAL YEAR FOR THE ARMED FORCES AND FOR CIVILIAN EMPLOYEES OF THE DEPARTMENT OF DEFENSE, AND FOR OTHER PURPOSES

PART 7

STRATEGIC AND THEATER NUCLEAR FORCES

MARCH 6, 9, 13, 15, 29; APRIL 12, 26; MAY 1, 4, 1984

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DEPARTMENT OF DEFENSE AUTHORIZATION FOR APPROPRIATIONS FOR FISCAL YEAR 1985

TUESDAY, MARCH 6, 1984

U.S. Senate,
Subcommittee on Strategic and
Theater Nuclear Forces,
Committee on Armed Services,
Washington, DC.

ICBM MODERNIZATION PROGRAM

The subcommittee met in open session pursuant to notice, at 2:05 p.m., in room SR-222, Russell Senate Office Building, Senator John W. Warner (chairman) presiding.

Present: Senators Warner, Thurmond, Cohen, Exon, and Levin.

Staff present: Robert F. Bott, William E. Hoehn, Jr., George K. Johnson, Jr., professional staff members; Brenda K. Hudson, assistant chief clerk; Douglas R. Graham, research assistant; and Karen A. Love, staff assistant.

Also present: Gerald J. Smith, assistant to Senator Goldwater; Les Brownlee, assistant to Senator Warner; Bernard R. Toon, assistant to Senator Quayle; Jeffrey B. Subko, assistant to Senator Exon; and Peter D. Lennon, assistant to Senator Levin.

OPENING STATEMENT BY SENATOR JOHN W. WARNER, CHAIRMAN

Senator Warner. This afternoon the subcommittee welcomes Assistant Secretary of the Air Force Thomas Cooper, a fine able professional known to all of us in the Congress very well. He is accompanied by Lt. Gen. Robert Russ, Maj. Gen. John Shaud, and Brig. Gen. Gordon Fornell.

We are here to receive a progress report on the ICBM modernization program that was endorsed by the Congress a little less than a year ago, following the report of the administration's Commission on Strategic Forces.

It appears that the Peacekeeper portion of the modernization program continues to be an area in which the Congress will continue to have close scrutiny. The need for Peacekeepers as articulated by the Scowcroft Commission—to demonstrate national resolve, to redress significant asymmetries in our ICBM capabilities, and to induce the Soviets toward serious arms control negotiations—the question is, are they as compelling today as they were a year ago?

In fact, based on the intelligence briefings this subcommittee has received, the pace at which the Soviets are modernizing their strategic forces indeed appears to be in excess of what we are currently endeavoring to do.

In addition to a progress report on the Peacekeeper development program, we look to the testimony today to provide military and economic considerations that support the requested missile procurement level.

We will lead off with Secretary Cooper.

STATEMENT OF HON. THOMAS COOPER, ASSISTANT SECRETARY OF THE AIR FORCE FOR RESEARCH, DEVELOPMENT AND LOGISTICS, ACCOMPANIED BY LT. GEN. ROBERT D. RUSS, USAF, DEPUTY CHIEF OF STAFF FOR RESEARCH, DEVELOPMENT AND ACQUISITION; MAJ. GEN. JOHN A. SHAUD, USAF, DIRECTOR OF PLANS, OFFICE OF THE DEPUTY CHIEF OF STAFF, PLANS AND OPERATIONS; AND BRIG. GEN. GORDON E. FORNELL, USAF, SPECIAL ASSISTANT FOR ICBM MODERNIZATION

Mr. Cooper. Thank you very much, Mr. Chairman. As always, it is a pleasure for us to appear before the committee.

You have introduced my colleagues here today: General Russ on my right, who is our Deputy Chief of Staff for Research, Development and Acquisition; and to my far right is Brig. Gen. Gordon Fornell, who is General Russ' Special Assistant for the ICBM modernization program; and to my left is our operator, Gen. John Shaud, who works for Gen. Jack Chain, the Deputy Chief of Staff for Operations and Plans.

As you have mentioned, Mr. Chairman, the purpose of our hearing today is to discuss the ICBM modernization program. I would like to draw your attention to the chart on my right, which is to your left.

We will appear again on Friday before this subcommittee to discuss the bomber modernization program. Today we will restrict our comments, however, to the ICBM program.

Mr. Chairman, as you well know, we have had a number of very turbulent years as far as the ICBM program is concerned, and I am pleased today to bring good news to you. I think the program has stabilized.

We are following the Scowcroft Commission recommendations to a "T", we are right on schedule in developing, procuring, and deploying 100 Peacekeeper missiles as recommended by the Commission. Those will be deployed in existing Minuteman III silos.

We have had three what I consider to be extremely successful tests to date. We had one small, minor problem in the December test, where on the third stage we lost the extendable nozzle exit cone. But other than that, we are extremely pleased with the progress to date on our program.

We also, as recommended by the Scowcroft Commission, have an aggressive small ICBM program under way. We have now established a separate program office out of the Ballistic Missile Office at Norton Air Force Base in California. It will have its own assets. We are in the process right now of robusting the office in terms of placing people there.

Of course, the program is still in its infancy. It has been in existence less than a year. Mr. Orr, on his own initiative has directed, to give the program more visibility, that a brigadier general will be placed in charge of the office, and that should happen within the next 3 months.

I personally think that this is an important thing to do. Our resolve to bring forward the small missile program was questioned at various points last year, and I want to assure you that this program has support at the very highest levels in the Air Force, and in the Department of Defense. Secretary Weinberger is personally reviewing the program periodically.

The third thing that was recommended in the Scowcroft Commission was that we undertake a very aggressive ICBM technology program. We are doing that, and General Fornell will discuss that in some detail.

Mr. Chairman, as you mentioned, I really do not think—and I concur with your remarks—that this is the year for change. We believe that the need for the ICBM modernization program is indeed greater today than it was last year, when you measure it against the Soviet activities.

Senator **WARNER**. I carefully said those are the questions.

Mr. **COOPER**. Well, I misunderstood. In attempting, then, to answer that question, I do believe that the need is still there. In fact, it is more pressing today.

We do have a stable program. This year is in our view not the year to change it, and what we ask of you is for your continued support, and the support of this committee has been very genuinely appreciated. If it were not for this committee, I do not believe we would have the program we have underway today. And what we would like to do is to do our job and keep it smoothly on track.

Within those very general remarks, Mr. Chairman, what I would like to do is, with your concurrence, enter our prepared statement in the record and turn this over now to General Russ, who will give a brief overview of the program.

[The prepared statement of Dr. Cooper follows:]

UNITED STATES AIR FORCE

FY 1985 BUDGET ESTIMATES

- AIRCRAFT PROCUREMENT
- MISSILE PROCUREMENT
- RESEARCH, DEVELOPMENT, TEST & EVALUATION

JOINT STATEMENT OF

HONORABLE THOMAS E. COOPER
ASSISTANT SECRETARY OF THE AIR FORCE
(RESEARCH, DEVELOPMENT & LOGISTICS)

LIEUTENANT GENERAL ROBERT D. RUSS
DCS/RESEARCH, DEVELOPMENT & ACQUISITION
HQ, UNITED STATES AIR FORCE

PRESENTED TO THE 98TH CONGRESS 1984

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON, D.C.

Members of Congress

Over the past two decades, the Soviets have relentlessly modernized and expanded their military capability. To counterbalance this massive Soviet buildup, this nation has, for the past three years, been embarked on a steady course to restore the strength and credibility of our strategic and conventional forces. Our sustained national commitment to a stronger defense has been a signal to the world of our resolution to protect our vital interests from the global Soviet reach.

The Air Force budget request for Fiscal Year 1985 remains consistent in its priorities and continues the momentum to rebuild the deterrent capability of our forces. Our modernization programs have laid the foundation for a well-balanced and measured course to correct our most pressing deficiencies in our on-line weapon systems and in our readiness and sustainability.

This statement is organized according to Air Force budget priorities. Our objective is to maintain quality people and a quality force. After people, our priorities are to modernize our strategic forces, to improve the readiness and sustainability of our forces, to enhance our force projection capabilities, modernize and expand our theater forces, and improve our capabilities in space.

For your convenience and ease of review, we have included an Executive Summary to this statement which describes the threat to U.S. national security and the thrust of the major Air Force research, development, acquisition and logistics programs to meet that threat. Following the Executive Summary is an Introduction to our major Air Force investment programs. Our acquisition initiatives and our technology base efforts are also highlighted in the Introduction. The remaining Sections follow our budget priorities and discuss the major programs within each priority for Fiscal Year 1985.

Since the research, development, acquisition and logistics programs represent future capabilities, it is important that they be carried out fully and completely--not just for Fiscal Year 1985, but for years to come. Our programs are economically feasible and supportable over the long run. In addition, we are emphasizing efficiency, better management and innovative cost-effective approaches in the selection and development of our weapon systems.

We urge your support for the Air Force programs in the Fiscal Year 1985 budget request.

Thomas E Cooper
THOMAS E. COOPER
Assistant Secretary of the Air Force
(Research, Development and Acquisition)

ROBERT D. RUSS, Lt Gen, USAF
Deputy Chief of Staff, Research
Development and Acquisition

EXECUTIVE SUMMARY

We begin our statement with an overview of the serious threat which confronts the United States--the ever increasing military power of the Soviet Union. It is this threat that determines our budget priorities, as well as our programs for the next five years. Our objectives are to develop and field weapon systems necessary to meet the Soviet challenge in the late 1980s and beyond, and to get the most out of the defense dollar. In addition, we are firmly resolved to increasing efficiency in our weapon system acquisition process, controlling cost and using our technological advantage.

The Soviets are building a vast military machine which each year encourages them to undertake more political and military adventurism. Soviet military investment during the last 10-15 years has resulted in a larger, more modern and ever growing Soviet military force structure, both strategic and conventional. These investments have allowed them to steadily gain military advantages, which, if left unchallenged, would create a dangerous instability in the balance of power. It is important to note that through the rest of the 1980s, even with the projected increases in U.S. defense spending, the Soviets will continue to outspend and outproduce us.

The Soviet threat is real. It is a threat that will not dissipate in the foreseeable future. We face an adversary whose long term political goals are incompatible with our own. It is imperative that we continue our efforts to protect our vital interests around the world, to deter any use of force, and to develop a firm basis for negotiating reductions in nuclear armaments.

The Air Force budget request for Fiscal Year 1985 represents a realistic assessment of the programs necessary to respond to the Soviet threat. The request was constructed with considerable deliberation regarding a balance among required military capability, program priorities and available resources. Our objective is to maintain quality people and a quality force. After people, our priorities are to modernize our strategic forces, to improve the readiness and sustainability of our forces, to enhance our force projection capabilities, modernize and expand our theater forces, and to improve our capabilities in space.

Today's investments in research, development, test and evaluation, procurement and military construction provide tomorrow's force structure growth and capability. In Fiscal Year 1985, about 60 percent of our total request is for investment programs. To maximize the return on this investment, the Air Force has several management initiatives underway to enhance program stability, control cost and revitalize the industrial base. By managing our defense dollars wisely, we benefit not only from lower acquisition cost, but also lower life cycle cost. Of special importance to our future is our investment in the technology base. Opportunities for applying technology, such as very high speed integrated circuits and laser beams, to military capability must continually be researched and developed if we are to maintain technological superiority in the future. Continued support for our technology base programs will assure a prudent investment in our future defense against Soviet military aggression.

Air Force people continue as our first priority. We have the best people in the world doing the most important task we can ask them to do--protect our national security. These men and women do the job we ask of them, and do it well. In return, we must continue to treat them equitably and fairly if we are to retain them and if we are to recruit qualified replacements for those we lose.

Our number one mission area priority is strategic forces. This is a fundamental element of the Administration's plan to achieve true arms reduction through negotiation, not intimidation. For the Air Force, the objective is clear--to improve our strategic command, control and communications systems and to modernize the intercontinental ballistic missile and the bomber legs of the strategic Triad. Our current forces are old. The newest intercontinental ballistic missile, the Minuteman III, entered the force over 10 years ago and our newest heavy strategic bomber, the B-52H, has been in the force over 20 years.

As the most critical element, strategic command, control and communication holds the highest priority within the President's Strategic Modernization Program. The command, control and communications link to the National Command Authority is vital, and our programs focus on communication links which are survivable in all scenarios. Such programs as MILSTAR and the Ground Wave Emergency Network will greatly improve our ability to communicate with our strategic forces and enhance our deterrent capability. Strategic command, control and communications forms the capability bridge between offensive and defensive forces.

In offensive forces, the Peacekeeper is being developed according to the Presidentially-approved Scowcroft Commission recommendations. It is urgently needed to strenghten our deterrent posture. We are now in full scale development and are planning an initial operational capability in late 1986.

We are also developing a small intercontinental ballistic missile to complement the Peacekeeper and sustain our nuclear deterrent capability in the 1990s and beyond. We are now investigating and assessing alternate technologies in a system definition phase. Design selections for the small, single warhead missile, its transporter and the operational mode will be made by early 1987.

The B-1B remains the centerpiece of the modernization of the bomber leg of the strategic Triad. The manned bomber is the most flexible of strategic weapons. For the near term, the B-1B, in conjunction with the B-52s, Air Launched Cruise Missiles, and targeting sensor enhancements, will provide a powerful, accurate, and reusable weapon delivery system. For the far term, the B-1B, the Advanced Technology Bomber, and the Advanced Cruise Missile, with their designed-in low observables technologies, will comprise the bomber leg of the U.S. strategic Triad for the next 30 years.

Strategic defense programs are designed to upgrade aging surveillance and warning systems and expand our capability to meet evolving atmospheric, missile, and space threats. We are participating in structuring a program to support the President's Strategic Defense Initiative to counter the Soviet ballistic missile threat with measures which are defensive, rather than retaliatory. The Initiative integrates many technology programs including surveillance, acquisition, tracking, kill assessment, and directed energy weapons. Initial studies on strategy and technology have been completed and a long term research and development program is being defined.

Improving the readiness and sustainability of our combat force continues to be one of our highest priorities. Readiness is the capability of forces, units, weapons systems, and equipment on-hand to accomplish assigned missions. It is achieved through realistic operational training, maintaining elements of the force at a high proficiency level, and ensuring each unit has sufficient spare parts to begin combat. Sustainability is the "staying power" of our forces to fight during and beyond the initial period of combat. Sustainability is our ability to replace those resources used during combat by having the ability to generate adequate spares, supplies, munitions and fuel. Sustainability is a function of peacetime stocks, the support infrastructure, war reserve material, and industrial production.

When our forces are well equipped, ready for combat and capable of conducting sustained combat operations, then our deterrent capability is enhanced. During the past three years, we have been redressing the low defense spending of the mid-to-late 1970s that resulted in a major reduction of readiness and sustainability through deteriorated physical plant, cutbacks in combat crew training, and large backlogs of equipment and facility maintenance. Our Fiscal Year 1985 budget request continues the trend to correct these deficiencies. This year's program emphasizes spare parts, munitions, fuel, support equipment and depot maintenance capability. We are also continuing the implementation of simulation to maintain weapons operation proficiency, and are requesting funds for sufficient wartime consumables and common ground equipment to underpin a ready and responsive force.

Our next mission area priority is enhancement of our force projection capabilities. Mobility forces are essential to our force projection strategy because they provide the link between force structure and combat capability. During critical early phases of a conflict, only airlift has the responsiveness and flexibility to meet mobility requirements in the days or weeks before the first sealift deliveries begin.

The evolving threat and the growing capability of the Soviets to attack with little warning have pushed demands for airlift well beyond the capabilities of our current forces. A rapid and sufficient airlift capability could prevent substantial losses and avoid an escalation of hostilities. Even with the enhancements planned for our existing forces, we will still have serious shortfalls in our capability for intertheater airlift of outsize, oversize, and bulk cargo.

Our overall airlift enhancement strategy is divided into three parts: improvements to existing forces, near term capability increases, and attaining the long term level of capability recommended by the Congressionally Mandated Mobility Study. Programs ongoing today to enhance our mobility posture include the modification of the C-5A wing, procurement of the C-5B and KC-10, modernization of the KC-135, building the Civil Reserve Air Fleet (CRAF) Enhancement Program and development of the C-17.

Modernizing our theater forces is the next mission area priority. To meet the challenges and threat confronting us throughout the world, our forces must be capable, flexible, ready, and sustainable. Our program to respond to this threat is based on reaching a balance between readiness and sustainability and modernization of our theater forces.

Our tactical air forces must be able to achieve air superiority, provide offensive air support to friendly ground forces, and interdict and destroy key targets. To quickly achieve and maintain air superiority, our forces must have aircraft that can detect and destroy numerically superior and sophisticated Soviet fighters and bombers. This requires effective avionics, weapons, and propulsion systems. Similarly our forces must have the aircraft and weapon systems that can operate effectively in an air-to-ground role at night and during adverse weather with minimum exposure and losses.

We have developed a Munitions Acquisition Plan to ensure we procure the proper mix of precision guided and unguided weapons. We have also developed a Tactical Fighter Roadmap to guide our fighter procurement. The roadmap includes the acquisition strategy for the required numbers of fighters, the right mix of fighters, and the quality improvements needed for our fighters.

The focus is on modernizing and expanding our existing force structure of F-15 and F-16 fighters and fielding a night and all-weather capability in both avionics and munitions. Our fighter enhancement programs include procurement of a more durable engine, a dual role fighter, and quality improvements such as the Advanced Medium Range Air-to-Air Missile and the Low Altitude Navigation and Targeting Infrared System for Night. For the 1990s, we are developing an Advanced Tactical Fighter that will ensure our qualitative edge in air-to-air missions.

Modernizing our theater forces also includes the deployment of the Ground Launched Cruise Missile in Europe to help correct the imbalance in capability between NATO and the Warsaw Pact. In addition, it includes our efforts to reestablish and maintain a credible chemical deterrent base on a strong chemical defense and an adequate retaliatory capability to deter Soviet use of chemical weapons against the United States or its allies.

Enhancing our capabilities in space is another one of our high budget priorities. Space is an environment which supports all of our mission areas.

Space systems are a vital element of our forces. Many of our missions require the global coverage and timely information which can only be provided from space systems. Because space systems enhance the effectiveness of our forces, we are improving their surveillance, communications, navigation, and survivability capabilities. We highlight our efforts in space as part of our strategic discussion because the space environment is significant to our strategic posture.

It is imperative that we continue to pursue our objectives to protect our vital interests around the world, to deter any use of force, and to develop a firm basis for negotiating reductions in nuclear armaments.

Congressional approval and funding of the programs in our Fiscal Year 1985 budget request will demonstrate our resolve to strengthen our national defense and protect our interests worldwide.

SECTION I

INTRODUCTION

THREAT TO NATIONAL SECURITY

Throughout the 1980s, the United States will continue to face a growing Soviet military threat to its national security. The Soviet Union has dedicated itself to constructing a military force second to none in the world. For the past twenty years, the Soviet Union has invested a substantial portion of its economic input to a build-up of military forces far beyond required defensive needs. For example, in 1983 the Soviets devoted approximately 15 percent of their Gross National Product to national defense versus seven percent for the United States.

During the 1978-1983 period, the Soviets spent twice as much as the United States on defense. During this four year period, they outproduced the United States in intercontinental ballistic missiles and submarine launched ballistic missiles (4.9 to 1), theater nuclear missiles (6.2 to 1), surface-to-air missiles (2.9 to 1) and tactical aircraft (1.8 to 1).

The growing strategic threat to the United States is a direct result of larger Soviet investments in strategic weapon systems during the past fifteen years. The momentum and magnitude of Soviet procurements has led to a significant increase in the numbers of Soviet ballistic missiles, reentry vehicles and delivery systems.

Over the last four years, the Soviets have added more than 2500 strategic nuclear warheads, and every indication points to them continuing to add to their total of more than 8,000 strategic nuclear warheads. They maintain the world's largest and most modern force of intercontinental ballistic missiles and ballistic missile submarine force. And they are demonstrating renewed interest in strategic bombers with the development of the new large BLACKJACK long range bomber and the series production of a new variant of the BEAR, designated the BEAR-H, specifically designed to carry long range cruise missiles.

Although the United States has an advantage in submarine launched ballistic missile reentry vehicles, the other Soviet quantitative as well as qualitative advantages have disturbing implications for strategic stability. Viewed in this context, the need for continuing the President's strategic modernization program is clear and compelling. It also emphasizes the criticality of pursuing genuine, equal, and verifiable reductions in nuclear weaponry to reduce the risk of war and enhance strategic stability.

Similarly in space, U.S. efforts have substantially lagged behind those of the Soviet Union. During the past ten years, the Soviets annually have launched four to five times as many space systems as the United States. Their annual payload weight placed in orbit was as much as 10 times that of the United States. The Soviet satellite and launch capacity provide them with unique military capability and flexibility, which they are intent on enhancing.

Since 1971 and the launch of their manned space stations, the Soviets have amassed twice as many man hours of in space experience as U.S. astronauts. By the end of this decade, the Soviets will be deploying a reusable launch vehicle similar to the U.S. space shuttle; they will also have two new expendable launch vehicles--one of which has five to seven times the capacity of the U.S. shuttle. Their new launch systems will allow greater support of their increasingly complex manned space missions, their expanding operational antisatellite capability, and their future space weapon systems, such as space-based lasers.

The following table, showing a comparison of in-place Warsaw Pact versus NATO tactical air forces, portrays the shift in conventional air forces which has resulted from the large spending difference between the superpowers:

Ratios of Warsaw Pact/NATO Tactical Air Forces

	1978	1983
Interceptors	4.6 : 1.0	6.0 : 1.0
Fighter-Bombers	0.9 : 1.0	1.0 : 1.0
Reconnaissance	1.6 : 1.0	2.1 : 1.0

The comparisons become even more disturbing if we examine the U.S./Soviet comparison in a broader context. The pre-1970 period was clearly a time of U.S. weapons superiority across the entire spectrum of conflict. Even then, the Soviets were building conventional weapons at a rapid enough pace to reach equivalence by the 1970s, although the United States maintained a slim lead in nuclear capability. Into the late 1970s, United States weapons development and production lagged to such an extent that nuclear capabilities have become essentially equivalent and the conventional weapons gap is, in fact, widening in favor of the Soviets. Trends such as these, if not reversed, could lead the United States to a position in the late 1980s of weapons inferiority.

Not only are Soviet weapon system quantities increasing, but their quality is also improving dramatically. For example, since 1970 we have seen six new series of advanced fighter aircraft, two new bombers, four new air-to-air missiles, six new surface-to-air missiles and ten new ballistic missile systems, some of the latter with very accurate hard-target kill capability. These quality enhancements come from a Soviet research and development infrastructure which continues to obtain and use Western technology and which employs 900,000 engineers and natural scientists in military purposes, while the United States uses less than 700,000. Students receive advanced degrees in scientific and technical fields in the Soviet Union at twice the rate of the United States, further enhancing the Soviet military technology infrastructure.

The objective of the President's defense modernization program is to arrest these trends and restore a more stable deterrent force balance. From this basis, the United States will actively pursue mutual arms reduction and control agreements which will assure an enduring parity of forces for the future.

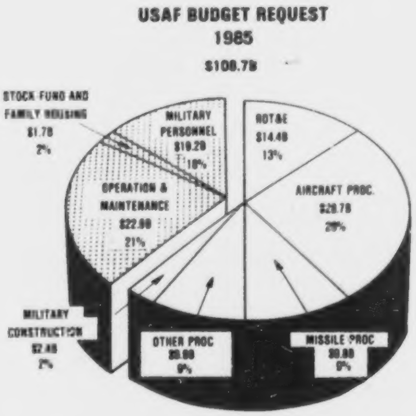
A credible deterrent requires modernization of U.S. strategic nuclear forces so that the Soviet Union will not have confidence in their ability to conduct a successful nuclear first strike. It also requires that the United States, along with its allies, modernize and maintain conventional forces that will likewise deter aggression. However, should deterrence fail, these forces must be capable of checking Soviet adventurism.

BUDGET PRIORITIES

The Air Force research, development, procurement, and logistics programs for Fiscal Year 1985 support U.S. national objectives for a credible deterrent with mutual arms reductions. These programs have been structured according to priorities that emphasize Air Force people first, then seek to modernize our strategic forces, build combat readiness and sustainability, enhance force projection, and modernize and expand our theater forces. These priorities are consistent with the program established by the current administration three years ago.

Subsequent sections of the statement will address the Fiscal Year 1985 Air Force research, development, acquisition and logistics programs in terms of their contributions to strategic forces, readiness and sustainability, force projection, theater forces, and space.

The Air Force budget request for Fiscal Year 1985 continues the momentum of modernizing our deterrent capability. Military investment, which consists of the procurement of weapon systems, RDT&E and military construction, is the key to future growth and capabilities. In Fiscal Year 1985, about 60 percent of our total Air Force request is for investment. The remaining 40 percent is for our operating accounts. The figure below illustrates the major appropriation categories of the Air Force budget. The clear area represents our investment accounts and the checkered area our operating accounts. Shown in each segment are the dollars requested for Fiscal Year 1985 and the percentage of the total budget request.



USAF BUDGET REQUEST
1985
$108.7B

Funding within the procurement and RDT&E accounts is provided in the tables at Appendix A. Detailed information is provided separately to Congress: for each of the procurement programs, in the Department of the Air Force Justification of Estimates for Fiscal Year 1985; and for each of the RDT&E programs, in the Descriptive Summaries for Fiscal Year 1985. Information on military construction programs is also provided to those committees responsible for authorizations and appropriations.

MANAGEMENT INITIATIVES

Supporting specific system programs and mission areas, the Fiscal Year 1985 program includes management initiatives to enhance program stability, control cost, and revitalize the industrial base.

We see program stability as the essential ingredient to truly effective cost control. We are attempting to stabilize procurements through emphasis on economic order quantities and stable production rates. The multiyear procurement technique continues to be the primary method by which we can benefit from program stability in our major programs. The approach has demonstrated significant savings in the past and will continue to be applied to stable programs to effect savings. Since 1982, when Congress expanded the Department's authority to use multiyear contracting procedures on major programs, the Air Force has initiated multiyear procurement on eight major programs with estimated savings in excess of 2.5 billion dollars. In Fiscal Year 1985, we are proposing multiyear procurement for F-16 Simulators and F-16 Airframes. The airframe proposal is a follow-on multiyear procurement to our successful Fiscal Year 1982 F-16 multiyear program for 480 airframes. This proposal will cover 720 airframes over four years and we estimate savings of $231.6 million will be realized by its enactment.

A system of baselines for major programs which will involve decisions and commitments by top Air Force leadership is also being implemented. Our intent is to improve control of a weapon system program with an agreed-to content and cost. We are also emphasizing up-front consideration of acquisition logistics in a program to achieve greater life-cycle cost savings.

Revitalization of the industrial base is extremely important to the overall defense capability of the nation. We are enhancing the readiness of the industrial base through a program of research, development, and acquisition of modern, automated production capability, combined with increased use of investment incentives to improve our production capability.

TECHNOLOGY BASE

The foundation of our military capability is our technology base. Our ingenuity continues to provide the technology we need to field modern and capable systems second to none. Today's technology base funding represents tomorrow's defense posture. Through basic research, exploratory development, and advanced technology demonstration, current problems are solved and new avenues are opened for future weapon systems. Maintaining technological superiority depends upon our support of the technology base, both in the military and commercial environments.

We have seen commercial research and development evolve into opportunities for new military applications. An example is the development of laser technology for communications, target designation, and in the future, target destruction. One of our most important technology efforts is the Very High Speed Integrated Circuits (VHSIC) program. VHSIC will accelerate by five years the availability of very large-scale integration for military systems, yielding 5- to 10-fold weight and size reductions, 100-fold throughput increases and 10- to 100-fold reliability improvements. The program has made excellent progress, with initial component deliveries set for 1984. Initial designs using VHSIC are already underway in five Air Force systems, including the ALO-131 electronic warfare pod and a generic digital signal processor. By the late 1980s, VHSIC will be the key implementing technology in dozens of applications ranging from radar to communications to autonomous weapons to electronic warfare. Military applications of these commercial technologies make investment in commercial R&D a long term multiplier for the national economy, as well as national security.

The sections which follow provide highlights of the major programs included in our Fiscal Year 1985 budget request. These programs, as well as the others in our request, will assure that our defense posture not only remains strong today, but will be even stronger in the future.

SECTION II

STRATEGIC FORCES

The massive, destabilizing and unrelenting arms build-up the Soviets have pursued over the last two decades has caused a shift in the strategic balance. This Soviet build-up of strategic forces is the result of a determined and sustained Soviet investment which, in the past ten years, exceeded that of the United States by about $320 billion (1985 dollars). We continue to see the results of these sustained investments. Soviet advantages in strategic force capabilities provide added incentives for Soviet adventurism and make meaningful and equitable arms reduction agreements more difficult to achieve. Unless the Soviet build-up is countered by U.S. initiatives through modernization and arms limitations, we face the ominous prospect of substantial Soviet military superiority and political adventurism in the years ahead.

Strategic forces remain our first priority for modernization in this budget request. This national commitment is dictated by the need to restore a margin of stability and deterrence in the strategic balance between the United States and the Soviet Union along with our desire to motivate meaningful arms control negotiations.

The primary objective of our strategic forces is to deter Soviet nuclear aggression and coercion against the United States, its Allies, or others whose security is vital to our national interests.

To maintain the credibility of this deterrent, our strategic forces must be clearly seen by the Soviets as able to respond appropriately at any level of conflict and as capable of denying their political and military objectives. Moreover, our strategic forces must be designed so that the Soviet Union will not perceive any advantage in initiating a nuclear attack in a crisis. Our forces must be able to hold at risk a wide range of the enemy's assets, including hardened military and leadership facilities, even after a Soviet first strike. If our strategic forces are clearly able to meet these conditions, then the Soviet Union can have no confidence that an attack by them would be successful.

Our strategic Triad concept--three separate and independent yet mutually reinforcing deterrent elements consisting of the submarine launched ballistic missile leg, the land-based intercontinental ballistic missile and the bomber leg (including cruise missiles and tankers)--supports deterrence in at least two important ways. First, it reduces our risk of being attacked since the Soviets would not be able to neutralize all three legs simultaneously. Second, it forces the Soviets to invest more resources in their defensive systems, rather than offensive, to counter the sea, land, and air threats presented by the strategic Triad. Modernizing our strategic Triad will redress the strategic imbalance and maintain a credible U.S. deterrent.

Equally important to our strategic deterrent capability are our strategic defense forces and the command, control and communications (C^3) elements which link all of our strategic forces into a coherent retaliatory system. Together they provide high confidence early warning, comprehensive support for the National Command Authority and commanders' decisions, and reliable command and control of our forces. Our strategic defense forces increase Soviet uncertainties in their capability to mount a surprise attack against the United States.

The deterrent capability of our strategic forces has served us well in the past, and will continue to serve us well in the future--but only if we continue to modernize and maintain the strength of each component of our strategic Triad and our strategic defense systems, as well as their supporting C^3. Revitalizing our strategic forces will not only provide a more secure and stable deterrence, but will also increase Soviet incentives to negotiate meaningful and verifiable arms reductions.

Space systems support both strategic and conventional forces by providing global coverage to missions more efficiently from space. Spaceborne surveillance, warning, communications, meteorological, and navigation systems increase the effectiveness of military operations on the modern battlefield.

Our objectives in space include: pursuing a vigorous R&D program to give us future options in space; placing in space those functions that can be accomplished more efficiently and more cost effectively; and developing an antisatellite system that assures our free access to space and deters Soviet attacks against our satellites in orbit.

Our plans for space include: making our space systems, including the satellites, the ground processing stations, and the user interfaces, more survivable from attack; improving the surveillance, communications, and navigation capabilities of our space systems; and increasing the robustness of our space system network by removing single nodes, procuring backup satellites, and reducing our dependency on overseas ground stations.

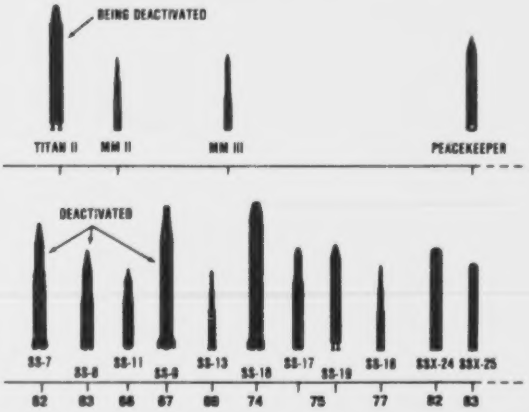
In addition, we are also concentrating our efforts on doing more with each launch by deploying satellites with multiple missions and with much longer operational life. To optimize our deployment and on-orbit performance, we are evaluating alternate space launch capabilities, improving our space operations capabilities, and aggressively pursuing advanced, space-related technology.

STRATEGIC OFFENSE

Land-based intercontinental ballistic missiles (ICBMs) have unique characteristics that are essential to deterrence. They are accurate, responsive, enjoy reliable real-time communications with command authorities, possess a short time-to-target capability, offer peacetime alert rates approaching 100 percent, and are less expensive to operate and maintain than the other two strategic Triad forces. Combined with the other force elements of the strategic Triad, ICBMs place significant stress on Soviet offensive and defensive capabilities.

However, over the last two decades, the Soviets have developed and deployed several generations of advanced ICBMs with large throwweight and high accuracy that have given them the capability of destroying significant portions of our existing Titan and Minuteman ICBM force in a first strike, while expending a relatively small proportion of their ICBM force.

U.S. AND SOVIET ICBM DEVELOPMENT HISTORY



Of equal importance, the Soviets have hardened many of their high valued strategic installations, including their ICBM silos and critical command and control facilities, to the point that our Minuteman force has only limited capabilities against them. This imbalance in such a critical component of strategic capability seriously undermines the effectiveness of our nuclear deterrent. This is an especially dangerous development in light of Soviet doctrine which, during time of war, stresses preemptive destruction of U.S. strategic forces and limitation of damage to the Soviet Union's forces and mainland.

Our latest efforts to address this imbalance were formalized in April of 1983 by the recommendations of the President's Commission on Strategic Forces. The resulting ICBM modernization plan is an integrated approach to (1) deploy 100 Peacekeeper missiles on a priority basis into existing Minuteman silos in Wyoming and Nebraska; (2) initiate immediate engineering design of a small, single-warhead ICBM; (3) investigate different types of land-based vehicles and launchers, particularly hardened vehicles; (4) undertake a research program to resolve uncertainties regarding silo or shelter hardness applicable to Peacekeeper and small missiles; and (5) continue research on the deep basing concept.

ICBM modernization is built on the realization that all ICBM tasks cannot be served by a single weapon and a single basing mode. Therefore, the President's ICBM modernization plan is based both on a near-term and long-term phased approach. The near-term phase, Peacekeeper in existing silos, will reduce the current Soviet advantage in ICBM capability and help deter the threat of conventional or limited nuclear attacks on the United States and its allies. For the long term, compatibility of ICBMs with the need for flexibility and innovation in responding to possible Soviet actions is very important. This phase will include deployment of a small, single-warhead ICBM in one or several basing modes, with mobility being emphasized, and continuing evaluation of ICBM deployments. Our modernization program is intended to satisfy the immediate needs of our ICBM force, and provide a transition toward more stable ICBM deployments with reduced target value and more flexible basing for greater survivability. This phased approach will enhance strategic stability, encourage arms control measures, and reduce the risk of war.

The Peacekeeper missile is a four-stage ICBM that is planned to carry ten independently targetable warheads. Peacekeeper will be more accurate, carry more warheads, and have greater range and targeting flexibility than the Minuteman ICBM. Along with these advantages, its greater resistance to nuclear effects and its more capable guidance system provide the Peacekeeper with a much-improved capability to destroy very hard targets. The highly accurate Peacekeeper will start to redress the current imbalance in U.S. and Soviet hard-target capability; upgrade some of the aging U.S. ICBM force; be fully compatible with existing and proposed arms agreements; provide an impetus to serious negotiations; and demonstrate U.S. resolve to maintain a strong strategic deterrent.

One hundred Peacekeeper missiles will be deployed in 100 existing Minuteman silos. The missile was designed to fit into existing silos without major silo modifications. Basing full scale development was initiated in June 1983 to define specific changes to the silos, C^3 improvements, and support facility requirements. A draft Environmental Impact Statement was prepared and released for public comment in October 1983. A 45-day public comment period ended on 28 November 1983. The final Environmental Impact Statement was released in early 1984.

Construction of support facilities will begin in mid-1984. Silo modifications for the first set of ten missiles will begin in early 1986, leading to an initial operational capability of ten missiles in December 1986. Full operational capability of 100 missiles will be achieved in December 1989.

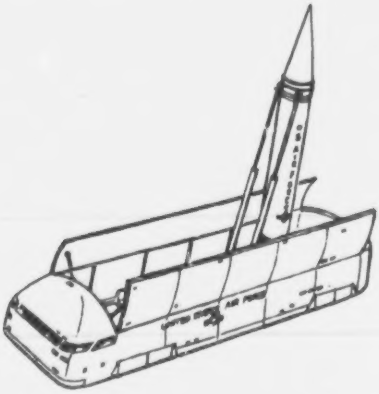
Peacekeeper Intercontinental Ballistic Missile

Peacekeeper is now in full scale development. A highlight of 1983 was the start of the combined Peacekeeper development test and evaluation and operational test and evaluation program. The first test flight was conducted 17 June 1983, the second 14 October 1983, and the third 20 December 1983. All were highly successful. Fiscal Year 1985 funding will be used to continue missile production, test and evaluation, construction of support facilities, and deployment planning and development.

The Department of Defense and the Air Force have made a very aggressive start in the development of a small Intercontinental Ballistic Missile (ICBM) and a hardened mobile transporter. In May 1983, a separate Program Office was established to be responsible for development and acquisition of the small ICBM and basing technology.

The Air Force also convened a group headed by retired General Bernard Schriever to recommend the best acquisition strategy and management approach. The Schriever Group recommended a three-phased program approach that the Air Force is now following: system definition, pre-full scale development, and full scale development. System definition now underway will involve assessment of alternative technologies. A key to developing the small missile is to build on Peacekeeper technology. Determining applicability will be a major goal of system definition.

Pre-full scale development will start in late 1984 and be characterized by competitive efforts on missile design and integration, the hard mobile launcher, and propulsion stages, leading to a firm system baseline. Full scale development will begin in late 1986 or early 1987 after selection of the best design for the missile, transporter, and operational basing mode or modes. It will lead to flight testing in 1988 and initial operational capability in 1992.



Artist Concept of a Small ICBM in Mobile Launcher

Major 1983 Small ICBM events were the solicitation of system definition contracts, the Direct Course Blast Test conducted 26 October 1983--which yielded valuable information on hardened mobile launcher capabilities--and the already mentioned Schriever Group report. The program is receiving extensive management visibility throughout the Office of the Secretary of Defense and the Air Force to ensure steady progress. An Office of the Secretary of Defense Small Missile Review Panel has been established, as well as a Small Missile Steering Group. Fiscal Year 1985 funding will be used to continue advanced development of the small ICBM and basing modes.

Follow-on basing technology efforts have been characterized by continuation of ongoing work in hardening and deep basing technology. Test results, which have been impressive, suggest that hardness levels up to 50 times greater than current U.S. silos may be achievable. Eight tests were conducted starting in late 1982 to develop and validate techniques for predicting and verifying hardness. These included the Dry Site Test series of six tests and two wet site tests. All were highly successful, indicating much promise for achieving predicted hardness levels.

Significant results were also achieved in deep basing technology. Two demonstrations were conducted at the Nevada Test Site in April 1983. The vertical egress paths consisted of approximately 100 feet of consolidated rock and approximately 50 feet of rubble to simulate a nuclear crater. Both demonstrations, using two tunnel boring machines, validated the feasibility of vertical egress. Research efforts now are concentrating on the effects of nuclear weapons and their ability to destroy or disable underground facilities and stored resources. Fiscal Year 1985 funding will be used to continue testing to validate technology and develop basing modes.

To provide timely response to Soviet technology advances, in Fiscal Year 1985 we are also continuing advanced development of ICBM subsystems in the Advanced Strategic Missile Systems (ASMS) program. These developments will provide further options to improve the accuracy of ICBMs and the ability of ICBMs to penetrate Soviet defenses. Results are being made available to the Navy for possible submarine launched ballistic missile application.

Modification programs for the Minuteman force include the Minuteman Extended Survivable Power program to provide lithium batteries for 200 Minuteman III silos. These batteries will extend Minuteman on-alert time significantly by augmenting existing commercial, stand-by diesel, and lead-acid battery power sources. Other modification projects in Fiscal Year 1985 support reliability and maintainability upgrades.

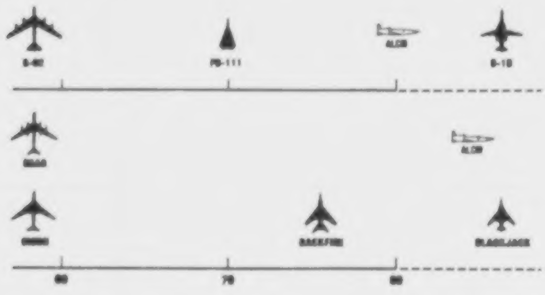
While we are implementing the ICBM modernization program, significant improvements will be made in their supporting C^3. We are continuing to improve the Minuteman communications system through increased reliability and enhanced connectivity with higher authority. The Peacekeeper program will improve the capability of the Airborne Launch Control System by adding an ultra high frequency uplink from each Peacekeeper launch facility. The ability to retransmit throughout the ICBM communications network is also being upgraded.

The unique military characteristics of the manned bomber provide a vital dimension of flexibility to our forces. They are an overt sign of committed, yet controlled national resolve, and as reusable strategic weapons systems, they can accurately deliver large nuclear or conventional payloads.

The strategic manned bomber has the capability to react effectively to crises prior to any decision to employ its payload. During a crisis, manned bombers can be launched to ensure their survivability, or to signal national resolve through show of force. As the situation requires, bomber crews can then be redirected or recalled with confidence. Once employed, their range, payload, and other operational characteristics enable bombers to penetrate enemy defenses to strike virtually any target. They also have the capability to conduct strikes against unanticipated, imprecisely located, or relocateable targets. In addition, through the use of human judgment and on-board sensors, crews can verify target location and evaluate target status prior to employing payloads. Thus, the high assurance of mission success, the time of flight to targets, and positive human control throughout the mission make the bomber a major element of crisis stability during periods of high tension.

The manned bomber provides a major element in our ability to project a nonnuclear force--either to complement our tactical forces or to respond to unforeseen contingencies worldwide. Additionally, bombers are able to provide maritime support to U.S. naval forces through long-range sea surveillance, ship attack and mine laying.

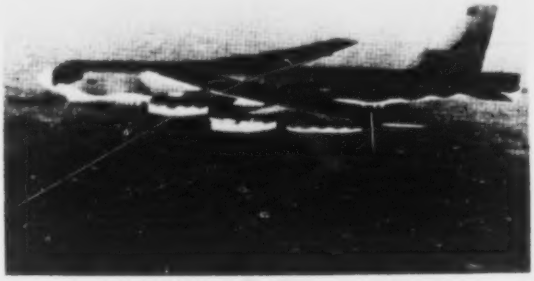
U.S. AND SOVIET BOMBER DEVELOPMENT HISTORY



The limitations inherent in the B-52, which has been operational for over a quarter of a century, make it imperative that we start fielding a follow-on bomber now. We have begun a time-phased bomber modernization program designed to effectively use the existing capabilities of the B-52 while laying the groundwork for our future bomber force.

We retired the last of our B-52Ds in 1983, and are phasing down our B-52 R&D efforts. However, we are continuing several modernization programs in Fiscal Year 1985 to take advantage of the strengths of our remaining B-52 forces. These programs include modifying the major portion of these forces for integration of the Air Launched Cruise Missile and upgrading the electronic warfare suite. In addition, we are continuing to incorporate the upgraded Offensive Avionics System on B-52Gs and B-52Hs. B-52s are also receiving reliability and maintainability modifications, such as the radar and autopilot upgrade, to keep them effective and safe to fly.

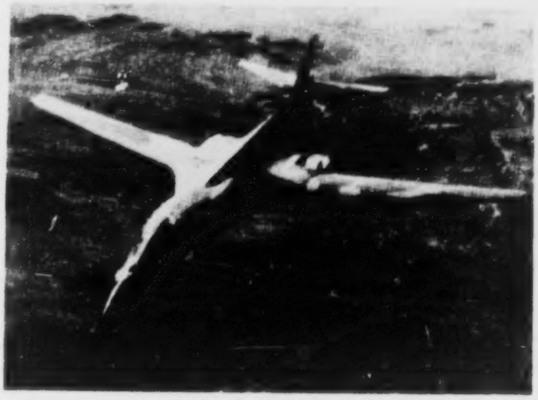
Conventional roles are receiving increased attention to match' their growing importance. The B-52/Harpoon program provides our near-term effort to meet increased responsibility to provide the U.S. Navy with maritime support. Thirty B-52Gs will be modified to carry the Harpoon missile beginning in Fiscal Year 1984. To enhance the B-52's land attack capabilities, we are pursuing a conventional standoff weapon for use against a variety of high value targets. The Strategic Conventional Standoff Capability (SCSC) program will develop the capability for longer term, broader based conventional missions. SCSC will be developed to ensure that the hardware, as well as the software knowledge we pick up developing this system, will be applicable to both the B-52 and the B-1B.



B-52 Bomber

To eventually replace the B-52s in their strategic role, the President announced in October 1981 a two bomber program consisting of the B-1B using today's technology and the Advanced Technology Bomber using more sophisticated developments in low observables technology. This force will be complemented by a force of cruise missiles. We will produce 100 B-1Bs which will have an initial operational capability in 1986. Acquiring the B-1B enables us to field the additional strategic forces required during a period when the United States must depend heavily on bombers while we take the proper steps to strengthen the intercontinental ballistic missile leg of the strategic Triad. For the far term, the plan is to develop and produce the Advanced Technology Bomber with an initial operational capability in the early 1990s.

As the first component of the President's two bomber program, the B-1B will be capable of performing the tactical and strategic missions of a conventional bomber, a cruise missile launch platform, and a nuclear weapons delivery system. The current program integrates proven technology and state-of-the-art systems. Its ALQ-161 defensive countermeasures system allows the B-1B to counter an evolving electronic threat. In addition, critical long-lead items necessary for initial production, such as forgings, tooling, and materials, are being used from the original B-1A program. The team of personnel managing the program is skilled and experienced.



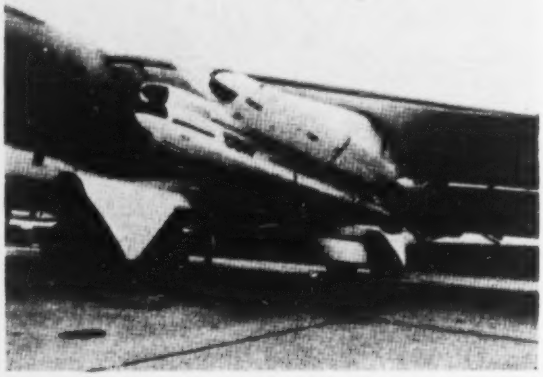
B-1B Bomber

The Fiscal Year 1985 B-1B RDT&E program includes the rollout and first flight of B-1B number 1. We will continue our full scale development efforts with emphasis on flight test, software and hardware development, and integrated logistics support activities. Procurement funds in Fiscal Year 1985 are for the production of 34 B-1B aircraft under multiyear contracts.

The Advanced Technology Bomber (ATB) is the other component of the President's two bomber program. We have selected the prime contractor and key members of the ATB development team. Program start-up is progressing smoothly. The ATB will use low observable techniques to negate present and projected Soviet air defenses. The technologies involved are exciting and promising, but they are still in early development stages.

We are confident that our orderly program to deploy the B-1B while developing an ATB is the most effective and efficient use of our resources for these important contributions to our Nation's defense. This is especially true in that the ATB represents a technological advance of extraordinary military significance. In the 1990s, a combined force of B-1Bs, ATBs and cruise missiles will place maximum stress on Soviet air defenses and provide the United States with a significant and resilient long-term deterrent capability.

Although no additional quantities of Air Launched Cruise Missiles (ALCM AGM-86Bs) are in this year's request, missile production and deployment are continuing in Fiscal Year 1985. These cruise missiles are a major addition to our bomber forces, enhancing their effectiveness against Soviet defenses and increasing coverage of projected targets.



Air Launched Cruise Missile

Three squadrons of B-52Gs equipped with AGM-86Bs are now operational, with a fourth squadron scheduled to be activated in Fiscal Year 1984. All of our development, test and evaluation and follow-on operational test and evaluation has been completed and the Strategic Air Command is in the process of conducting the integrated weapons system operational test and evaluation. Fiscal Year 1985 ALCM production funds are for ALCM support equipment common to the B-1 and the Advanced Cruise Missile program.

The Advanced Cruise Missile (ACM) will provide significantly improved range, survivability, accuracy, and flexibility for our cruise missile force. Last year, we held a competitive source selection and awarded the full scale development contract for the ACM. At the same time, we decided to procure 240 AGM-86Bs to allow for an orderly transition of improved cruise missile technology to our strategic deterrent forces. This approach provides a responsive, long-term contribution to the deterrent effectiveness of our air-breathing forces. This year we are continuing full scale development of the ACM.

The Advanced Air-to-Surface Missile (AASM) is a supersonic, low radar cross section nuclear missile that will supplement and eventually replace the aging Short Range Attack Missile. Technological advances provide the opportunity for major performance improvements compared to the Short Range Attack Missile in a minimum risk development program. AASM will provide the B-1B and the Advanced Tactical Bomber with a single high performance weapon that has the flexibility to strike any target. AASM is a new start in the Fiscal Year 1985 budget.

The Common Strategic Rotary Launcher (CSRL) program will provide integrated internal weapons carriage on current and planned bomber forces by consolidating several rotary launcher requirements into one CSRL. In addition to carrying gravity nuclear weapons and cruise missiles, the CSRL will be compatible with future nuclear and conventional standoff weapons. The CSRL will avoid launcher proliferation and reap the cost, operational, and support benefits associated with a common design. It will also enable us to more effectively employ such new weapons systems as the AASM.

Tanker aircraft are key to making our bomber, general purpose, and airlift forces function effectively. Our major effort is to modernize the KC-135A by replacing the current engines with CFM56 modern technology engines and upgrading 34 other systems. We are also continuing the wing reskin structural modifications to extend the KC-135 service life in line with force structure planning. The modernized KC-135Rs, which have the CFM-56 engines and upgraded subsystems, are an important, cost-effective investment in improved operational environmental and fuel efficiencies. The KC-135R provides the Air Force with a next generation tanker at significantly less cost than procurement of a new aircraft. We have also been modifying Air National Guard KC-135 aircraft to the KC-135E configuration by replacing current engines with the JT3D. Through Fiscal Year 1984, a total of 96 Air National Guard tankers were funded for modification with the JT3D.

STRATEGIC COMMAND, CONTROL AND COMMUNICATIONS (C^3)

Strategic command, control and communications (C^3) encompasses all systems capable of detecting, analyzing and reporting events critical to the survival of our strategic retaliatory forces. Strategic C^3 systems include surveillance systems, command and control centers, and supporting communications. Their main objective is to insure strategic connectivity between our warning sensors, command and control centers and nuclear forces before, during and after an attack.

Deterrence is enhanced if U.S. nuclear forces are perceived by the Soviets as capable of defeating or surviving a first strike. Deterrence is further enhanced if the Soviets believe the United States has the capability to inflict an unacceptable measure of damage upon them, if they decided to strike first. Strategic C^3 systems provide warning to our air defense forces responsible for defending the United States against an attack. They also provide the critical link from the National Command Authority, through the Unified and Specified commands, to U.S. nuclear retaliatory forces.

Because of the importance of strategic C^3, upgrading these systems is the first priority of the President's strategic modernization program. In order to maintain our deterrent credibility, upgrades to these systems must reduce vulnerability by countering physical attack, jamming, spoofing and nuclear effects.

Our current strategic C^3 systems are vulnerable in several respects. Land based systems are susceptible to blast damage, either from a precursor nuclear attack or by sabotage, to jamming and to the effects of electromagnetic pulse generated from a high altitude nuclear explosion. Some of our systems have limited communications capacity to handle increased amounts of data during crisis situations. Our satellite systems suffer from many of the same vulnerabilities.

In addition, the Soviet antisatellite systems pose a physical damage threat to our C^3 space assets. Blackout and scintillation effects due to nuclear events would disrupt C^3 links. While some of our satellites currently have an anti-jam capability, this advantage is gained at the cost of diminished capacity. Finally, our current satellites are heavily dependent upon highly vulnerable ground stations for global data relay.

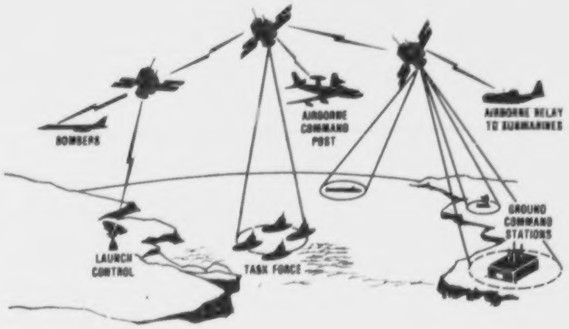
Near term improvements to ground based and satellite strategic C^3 systems are designed to ameliorate or negate the vulnerabilities stated above. Although no one system can achieve all the desired characteristics to meet the current and projected threat, a proper mix of ground based and satellite systems, along with redundancy of critical C^3 links and nodes, will provide high confidence that our strategic C^3 systems will survive and endure through trans- and post-attack phases of a Soviet nuclear strike.

A major initiative of the President's strategic modernization program is the MILSTAR satellite communications system which will provide two-way survivable and enduring secure voice and data connectivity to our decision makers, sensors and forces. The MILSTAR program has been designated by the President as a program of highest national priority.

The MILSTAR program is structured as a survivable, jam-resistant, worldwide communications system for the National Command Authority and the strategic and tactical forces of all services. It will utilize extremely high frequencies, crosslinks, frequency hopping, time shuffling, nuclear and laser hardening and other techniques to attain levels of survivability that will ensure that the minimum essential communications required for war are available.

The system will consist of satellites in 24 hour circular orbits at low and high inclinations; terminals at fixed and mobile command centers, on aircraft, ships and submarines, at missile launch control centers, and similar installations; and proliferated system control equipment on survivable platforms. While we are responsible for developing the satellites, along with the system control equipment and airborne terminals, the Army and the Navy are developing ground and seaborne terminals, respectively. Deployment of the MILSTAR will begin in the late 1980s and continue into the early 1990s.

MILSTAR
SATELLITE COMMUNICATIONS SYSTEM



The Air Force Satellite Communications (AFSATCOM) System provides worldwide, two-way command and control communications today for the President, the Joint Chiefs of Staff, the Commanders-in-Chief of U.S. strategic nuclear forces, and other high priority users. The space segment consists of ultra high frequency communications packages in orbit on board Fleet Satellite Communications satellites, Satellite Data System satellites, and other classified host spacecraft. The terminal segment of this program includes terminals for airborne and ground command centers, strategic bomber and reconnaissance aircraft, airborne communications relay platforms, and selected Army missile sites.

Although developed and deployed for command and control of strategic forces, AFSATCOM is also used in peacetime for training, contingency operations, crisis management, search and rescue, humanitarian missions, and for relay of reconnaissance information and missile testing data.

We began installation in mid-1978 with terminals on Strategic Air Command B-52 and airborne command post aircraft. In December 1983, we achieved full operational capability with over 500 ground and airborne terminals installed and operating.

In Fiscal Year 1985, we will initiate a series of upgrades to AFSATCOM terminals which will provide the means for transition to the MILSTAR satellite communications system. By beginning this effort now, virtually all the AFSATCOM terminals will be capable of using the MILSTAR spacecraft ultra high frequency channels after the first MILSTAR launch. In addition, these modifications will enhance terminal operation in the presence of jamming and improve performance during ionospheric disturbances.

Under the Minimum Essential Emergency Communications Network (MEECN) we are developing the first major communications system, the Ground Wave Emergency Network, to meet the high altitude electromagnetic pulse threat. We are also developing secure very low frequency/low frequency systems and reliable two-way adaptive high frequency communications.

The Ground Wave Emergency Network (GWEN) will complement MILSTAR by providing a survivable and enduring ground based communications capability between the National Command Authority and strategic installations, such as major command facilities, missile warning locations, and U.S. based nuclear forces. The system consists of a network of radio relay stations and user terminals that interconnect these installations.

The GWEN program is separated into three phases--concept development, full scale development, and production. Full scale development began in February 1983 and will continue through early 1986. The prototype network includes relay stations, input and output ground and airborne terminals, and receive only terminals. During Fiscal Year 1985, we will complete installation and most of the system level testing for the prototype network. Following a review of the test results, we will conduct initial operational test and evaluation and, based on those results, make a decision to begin production in 1986. Full operational capability is planned for Fiscal Year 1989.

Our MEECN very low frequency/low frequency (VLF/LF) Improvements project provides for improved dissemination of war orders through secure VLF/LF Systems. In Fiscal Year 1985, we are continuing the development of the diversity reception equipment for Worldwide Airborne Command Post aircraft and Minuteman Launch Control Centers and aircraft wing command posts. Also, development will continue for the VLF/LF miniature receive terminals for bomber aircraft. The diversity reception equipment will replace the existing MEECN transmit and receive equipment in ground and airborne applications. It will provide improvements in connectivity, message accuracy and transmission time. The miniature receive terminals will provide a high confidence strategic communications link for the B-1B, B-52H, and FB-111 aircraft.

In addition to these VLF/LF improvements, the MEECN adaptive high frequency (HF) communications program will provide a modular family of radios which will improve the reliability of two-way communications in a nuclear or jamming environment. In Fiscal Year 1985, we plan to go into full scale development for adaptive HF radios.

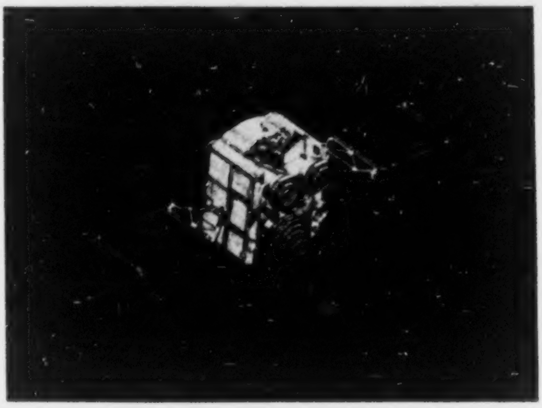
The Strategic Air Command (SAC) must currently rely on 1950s vintage communications equipment to support its critical command and control needs. This equipment has limited capacity, requires interconnection with expensive and vulnerable leased communication circuits and is becoming ever more difficult to keep operational. Under the SAC Communications program, we are developing the Aircraft Alerting Communications Electromagnetic Pulse upgrades and the SAC Digital Information Network.

In order to extend the electromagnetic pulse protection provided by the Ground Wave Emergency Network for emergency action communications equipments, the Aircraft Alerting Communications Electromagnetic Pulse (AACE) upgrade program will provide shielded enclosures for selected equipment at Strategic Air Command main operating bases in the continental United States. The screen rooms and associated interface consoles will also protect the communications equipment used to relay critical action messages from the command post to bomber crews in the alert facility or in the cockpit. In Fiscal Year 1984, we will undertake AACE full scale development. In Fiscal Year 1985, we will begin development test and evaluation of a prototype AACE system. If the results of the subsequent operational test and evaluation are satisfactory, we will purchase 23 AACE production units in 1985 and install them during 1986 and 1987.

The Strategic Air Command Digital Information Network (SACDIN) will use new programmable communications processors tied together in a switchable common-user network, and will provide a more reliable system of sufficient capacity to meet Strategic Air Command's needs, especially during peak traffic loads expected during a crisis. In Fiscal Year 1985, the Air Force will be well underway in producing and fielding SACDIN equipment, with an initial operational capability planned for 1985. SACDIN full operational capability is planned for 1987.

The Defense Satellite Communications System (DSCS) is an evolutionary Department of Defense system deployed to provide super high frequency satellite communications for secure voice and high data rate transmissions. DSCS provides unique and vital national security communications for worldwide military command and control, crisis management, intelligence information, and Presidential and diplomatic traffic.

In Fiscal Year 1985, our major DSCS RDT&E tasks are to complete first time integration of the DSCS III production satellites on the Shuttle and Inertial Upper Stage, and to complete the development of approved planned product improvements for the production satellites. Compared with DSCS II, DSCS III will provide more electromagnetic pulse hardening, increased jam-resistance and greater capacity. The DSCS III satellite also has greater flexibility and electronic counter-countermeasure capability. DSCS III will support strategic forces through the Single Channel Transponder, which incorporates an ultra high frequency and super high frequency capability for emergency action message dissemination and force execution.

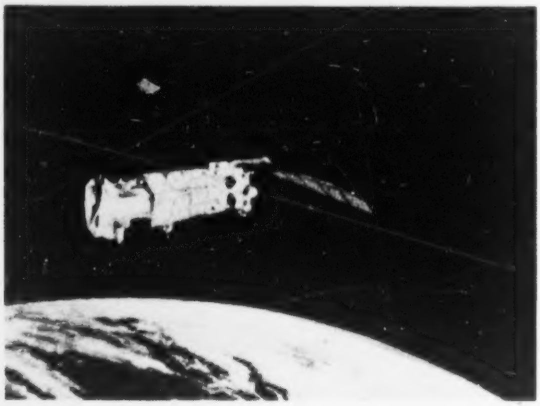


Defense Satellite Communications System

The DSCS procurement program will replace DSCS II satellites with DSCS III satellites. Five production DSCS III satellites have been procured through Fiscal Year 1983. In Fiscal Year 1984, we initiated an advance buy of parts as a multiyear procurement for the final seven DSCS III satellites. In Fiscal Year 1985, we will continue the multiyear procurement and produce the first two of the remaining seven DSCS III satellites; we will also initiate the economic order quantity procurement of all remaining parts and subassemblies for the seven satellites.

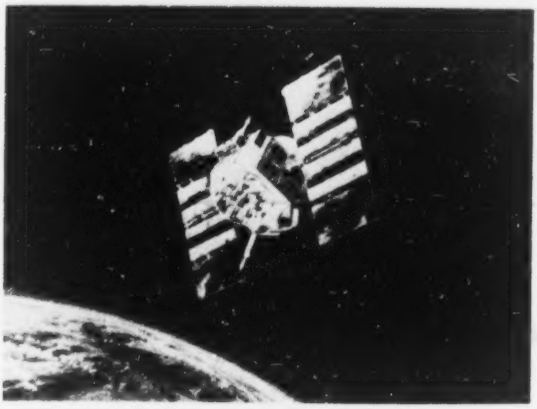
The Defense Meteorological Satellite Program (DMSP) is the Department of Defense's single most important source of weather data. The program is a joint service program with the Air Force serving as executive agent. In addition to supplying weather, environmental and oceanographic data to Air Force units, the data are supplied to Navy land and carrier based stations and Marine Corps transportable terminals.

In Fiscal Year 1985, we will be in the third year of a multiyear procurement of four spacecraft and imaging sensors. The contracts were negotiated at the multiyear procurement estimate and are proceeding well. The major RDT&E effort will be the continued design and development of a Space Shuttle qualified imaging sensor and the initial development of a Shuttle qualified spacecraft. In the terminal area, the program will continue production of new advanced fixed and mobile tactical transportable weather terminals for the Air Force and Marine Corps. Another development is the enhancement of the Satellite Control Facility antenna system at the Thule, Greenland tracking station to additionally receive and transmit DMSP command and control signals. This combining of functions will allow closure of the dedicated DMSP facility near Loring Air Force Base, Maine in the late 1980s.



Defense Meteorological Satellite Program

The NAVSTAR Global Positioning System (GPS) will become the Department of Defense's navigation system of the 1990s. GPS is a space-based radio navigation system which will provide users with all-weather, three-dimensional position, velocity, and precise time. GPS will provide a worldwide common navigation grid for land, air, and sea units to dramatically enhance coordinated operations. GPS will significantly improve the probability of target acquisition, low-level navigation to and from the target, flexible routing and, most importantly, the accuracy of weapons delivery. This, along with a capability for highly accurate passive operations, increases weapon system survivability and effectiveness.



NAVSTAR Global Positioning System

In Fiscal Year 1985, we are requesting funds for six of the multiyear procurement of 28 GPS satellites, as well as limited survivability enhancements. We will also complete the development of the user avionics, continue their integration into military weapons systems, and complete testing of the satellite qualification test vehicle. Also included is the continued funding of the five-satellite R&D constellation to support mapping, missile testing and avionics integration testing.

A trans-attack and post-attack assessment capability will be provided when the Integrated Operational Nuclear Detonation Detection system (IONDS) becomes operational in Fiscal Year 1988. IONDS payloads will be carried on NAVSTAR GPS satellites. These sensors will report nuclear detonation location, time and yield in near-real-time directly to user terminals.

They will allow us to better manage our forces by providing indications of which resources, both friendly and enemy, have been destroyed, aiding the recovery and reconstitution of our forces. In Fiscal Year 1985, we plan to continue development of the IONDS user terminal and procurement of the operational GPS/IONDS satellites.

The EC-135 airborne command post provides an airborne operations center to support continued command and control capability of our nuclear forces. These aircraft, along with the E-4B, National Emergency Airborne Command Post aircraft, form the basis of the Worldwide Airborne Command Post system.

The Strategic Air Command EC-135 airborne command post aircraft support the Post Attack Command and Control System, which is the link between the National Command Authority and our nuclear reserve forces in a post attack environment.

With the increasing age of the EC-135 aircraft and the increased national emphasis on strategic communications capabilities, the Air Force has developed plans to modernize the aircraft. A major by-product of this modernization will be increased maintainability and improved capability to operate in a nuclear environment.

Major modifications planned for the aircraft in Fiscal Year 1985 include the ultra high frequency/frequency division multiplex replacement, the AFSATCOM Secure Voice System and new high frequency radios. Other enhancements to be programmed in subsequent years include MILSTAR, the Ground Wave Emergency Network, improved diversity reception equipment, installation of the Integrated Operational Nuclear Detonation Detection System terminals, and the Automated Digital Information System. Additionally, several modifications are planned including the Peacekeeper C^3 upgrade for the Strategic Air Command.

Also in Fiscal Year 1985, we will complete the retrofit of the E-4A to E-4B Advanced Airborne Command Post aircraft. In addition, there are several modifications planned for the E-4B including improvements in the current E-4B communications equipment as well as some of those previously mentioned for the EC-135. For the future, we are currently preparing an acquisition plan and conducting tradeoff studies for a Worldwide Airborne Command Post replacement system.

STRATEGIC DEFENSE

Another integral part of our strategic deterrent posture is our strategic defense forces and systems. These vital forces enhance the survivability of our offensive forces and protect key elements of our military, political, and economic power base. They ensure that our strategic retaliatory capability survives a Soviet first strike by providing timely, reliable, and unambiguous warning, as well as assessment and defense.

Atmospheric warning and defense systems are required to defend against bomber and cruise missile strikes; missile surveillance and warning systems are required to provide warning and limited assessment of intercontinental ballistic missile and submarine launched ballistic missile attacks; and space surveillance and defense systems are required for warning and verification of, and defense against, attacks on U.S. systems in space.

Atmospheric defense of North America is a cooperative U.S. and Canadian effort. The primary mission of strategic air defense forces is to provide timely, credible tactical warning and defense against enemy bombers, air-to-surface missiles and cruise missile attacks. These surveillance and defense forces also control access to North American airspace in peacetime.

Current U.S. surveillance and defense systems against an atmospheric threat are largely a product of the 1950s and have been significantly reduced in numbers over the years. Those systems which remain were designed against a medium to high altitude bomber threat. Against today's low altitude bomber threat, these systems are extremely limited. They provide little low altitude detection coverage. They provide very limited long range surveillance and have little survivability.

The current surveillance systems consist of the Distant Early Warning Radar Stations across northern Alaska, Canada and Greenland, and the Joint Surveillance System radars. The latter includes the radars around the periphery of the continental United States, radars in Alaska, and the Continental Air Defense Integration North Pinetree radar stations across Southern

Canada. Command and control of fighter forces is provided by the Joint Surveillance System Region Operations Control Centers and the E-3A.

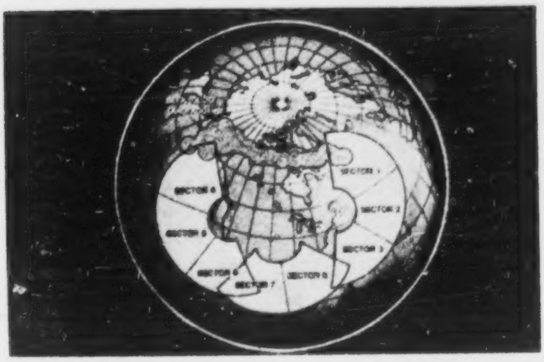
The Soviet threat is growing in numbers and capability with the introduction and continued production of BACKFIRE bombers and improved air-to-surface missiles. Soviet BEAR bombers, long thought to be on their way out, are being modified to carry cruise missiles. In fact, new BEAR bombers are being produced that are estimated to be able to carry cruise missiles. In addition, a new strategic bomber which is similar to but larger than our B-1B, called the BLACKJACK, is expected to become operational during the 1980s; it will also heve a cruise missile capability.

More significant is the development and estimated deployment of cruise missiles by Fiscal Year 1984 or 1985. The cruise missile, capable of being carried by both aircraft and submarines, is the most severe threat to our capability to ensure atmospheric tactical warning to the National Command Authority. Given this growing threat, more capable U.S. atmospheric surveillance and defense systems are necessary to preclude vulnerability to a no-warning bomber or cruise missile attack, as well as to limit damage from follow-on bomber strikes.

As part of the President's strategic modernization program, the Department of Defense developed a North American Air Defense Master Plan in 1982 to guide improvements and modernization of air defense forces. Our first major initiative to improve air surveillance and warning is the development and deployment of Over-the-Horizon Backscatter radars and replacement of the existing Distant Early Warning radars.

The Over-the-Horizon Backscatter (OTH-B) Radar will correct many surveillance deficiencies by providing long range, all altitude, wide area warning of attack from the east, west and south. In Fiscal Year 1985, the Air Force will continue the deployment of the East Coast Operational Radar System and procure the third 60 degree surveillance sector (Sector 3) for the East coast system, as well as initiate procurement of the first 60 degree surveillance sector (Sector 4) for the West coast system. The remaining two West coast sectors (Sectors 5 and 6) will be procured in Fiscal Year 1986. In addition, the Air Force is planning to deploy a south looking OTH-B radar in the late 1980s (Sectors 7 and 8).

NORTH AMERICAN AIR SURVEILLANCE SYSTEM



In the north, the existing line of Distant Early Warning (DEW) radar stations will be replaced to provide credible long range all altitude coverage to complement OTH-B surveillance. The 31 existing DEW radars, which are old and difficult to maintain, will be phased out and replaced with a total of 52 radars: thirteen long range minimally attended radars and 39 short range unattended radars. In Fiscal Year 1985, the remainder of the long range radars will be procured, communications upgrades will begin and development testing of the short range radar will continue. Both the OTH-B and improved DEW radars will provide a capability to detect and track long range cruise missiles; however, they are not intended to survive a nuclear attack.

Other significant improvements include additional F-15s for air defense, E-3A Airborne Warning and Control System (AWACS) procurements, and F-16s for strategic defense. With its long-range radar and look-down, shoot-down capability, the F-15 will substantially improve our air interceptor force. The Air Force is converting four active F-106 air defense squadrons to F-15s. The F-16, modified to carry the all weather Advanced Medium Range Air-to-Air Missile, will be used by the Air National Guard for strategic defense. The E-3A is essential to ensure survivable surveillance and to meet command and control requirements. These programs will greatly enhance our defense against bombers and cruise missiles.

F-15 Air Defense Fighters

Beyond 1990, the emphasis in air surveillance will be to deploy survivable ground-based and space-based systems. In Fiscal Year 1985, as part of the Missile Surveillance Technology program, the Air Force will begin development of critical technology for space-based detection of cruise missiles. The joint Air Force and Navy program for a space-based radar and infrared system will continue concept definition to meet the wide area atmospheric surveillance needs of the 1990s.

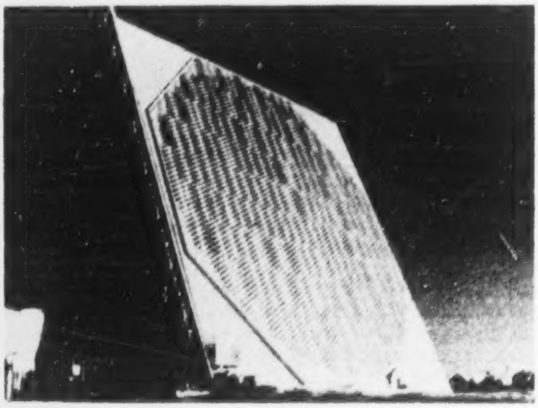
Ballistic missile attack warning and assessment are currently accomplished by space satellite systems, three Ballistic Missile Early Warning System sites, the Perimeter Acquisition Radar Attack Characterization System (PARCS) radar, two PAVE PAWS submarine launched ballistic missiles detection and warning sites on the east and west coasts, and the AN/FPS-85 and AN/FSS-7 submarine launched ballistic missile radars in Florida.

These systems provide surveillance of all fixed Soviet intercontinental ballistic missile launch areas and observed ballistic missiles submarine patrol areas in the northern hemisphere. They also provide some limited attack assessment. The growing Soviet submarine launched ballistic missile threat requires the United States to modernize its existing radars and expand radar deployments to cover attacks from all directions, especially from the Southeast and Southwest.

We are upgrading our surveillance and warning systems, as a part of the President's strategic modernization plan and to meet our national requirements for accurate and timely missile warning and attack assessment data. To minimize potential escalation of a limited war, we must be able to assess the magnitude and scope of an attack so that we can select an appropriate and effective response.

In response to the expanding Soviet submarine launched ballistic missile (SLBM) threat, we are deploying two additional PAVE PAWS radars in the southeastern and southwestern United States. These deployments, along with the PARCS Radar and the two existing PAVE PAWS sites, will complete the planned five site phased array SLBM radar warning network, will close gaps in coverage, and enable us to phase out the older, less capable AN/FPS-85 and AN/FSS-7 SLBM radars in Florida.

In Fiscal Year 1985, efforts will continue on the deployment of the new PAVE PAWS radar at Robins Air Force Base, Georgia and Goodfellow Air Force Base, Texas. In Fiscal Year 1986, we plan to further enhance the capability of the Robins radar to track satellites and provide improved warning capability. Similar warning capability improvements will be added to the Otis and Beale Air Force Base radars in 1987.



PAVE PAWS Radar

The Ballistic Missile Early Warning System (BMEWS) modernization program is replacing existing 20 year old conventional radars at the Thule, Greenland site with a new solid state phased array radar. This will greatly reduce the danger of the system becoming saturated in a dense attack and will allow it to provide better pre-impact assessment. In Fiscal Year 1985, we will continue systems engineering and software development for the new Thule radar.

Our Ballistic Missile Tactical Warning/Attack Assessment System develops and maintains the overall architecture for current and programmed systems to ensure that individual warning and attack assessment elements operate coherently as an integrated system. The program also provides a formal mechanism to assure that modifications to systems are certified as operational prior to declaring initial operational capability.

For the far term, we are continuing to pursue technology for an advanced surveillance system for improved long-term survivable warning and attack assessment. Infrared data on earth background and ballistic missile signatures are now being collected and analyzed in the Missile Surveillance Technology (MST) program. In Fiscal Year 1985, we will assess data on cruise missile surveillance.

Our longer term efforts supports development of required technologies and designs for an Advanced Warning System (AWS) program. As an element of the President's Strategic Defense Initiative, the AWS will provide a survivable strategic missile warning capability for the 1990s, with growth capabilities to communicate information to battle manager and subsequent layers of other defense systems. In Fiscal Year 1985, we will continue AWS concept definition.

Our current space surveillance system is composed of three Ground-based Electro-Optical Deep Space Surveillance (GEODSS) stations and a number of dedicated and contributing radar stations. Against today's threat these systems require improved low altitude coverage, high altitude detection capability and reporting of space events in a timely manner. The current command and control functions provided by the North American Aerospace Defense Command Combat Operations Center are essentially manual and require improvements to support coordinated or integrated responses to potential military conflicts.

Our space surveillance and space defense programs will improve surveillance, increase survivability, develope an antisatellite system and enhance selected C^3 elements.

The SPACETRACK program focuses on improving our ability to monitor space activities. Surveillance is the key to our warning and defensive options, and we are pursuing several near-term efforts to upgrade our surveillance capability in our SPACETRACK program. In Fiscal Year 1986, we will begin testing at the GEODSS site in Diego Garcia; that site will become operational in Fiscal Year 1987. A five site GEODSS system providing global deep space surveillance will be completed in Fiscal Year 1988. Other improvements to our SPACETRACK capability include refurbishment of radar sensors and implementation of an improved radar calibration capability to provide future support to our antisatellite system.

For the far term, the thrust of our space surveillance technology effort under the President's Strategic Defense Initiative is to develop a space-based space surveillance (SBSS) system which will provide full earth orbit coverage, reduce dependence on overseas basing of sensors and provide timely, operationally responsive coverage of objects and events in space. Our efforts will be meshed with other related work under the Strategic Defense Initiative. In Fiscal Year 1985, we will complete a program to gather infrared background data needed for the SBSS system. We will also continue SBSS system concept definition, along with technology demonstrations to support the final SBSS design and development. Concept definition includes consideration of ballistic missile midcourse surveillance requirements so that the SBSS system could satisfy a range of strategic surveillance missions.

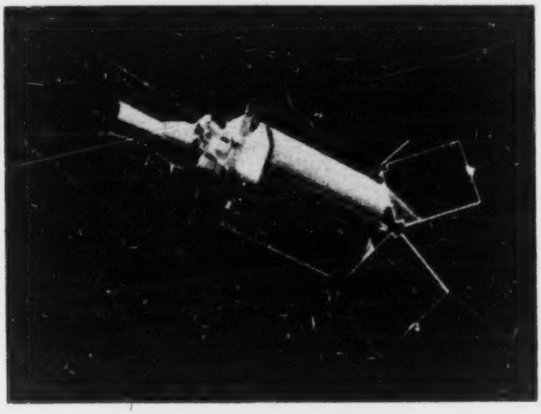
The Soviets' enormous potential for electronic intervention, coupled with their demonstrated antisatellite capabilities, require that we take prudent steps to defend our satellites. In the Satellite Systems Survivability program, we are developing technology and procedures which can be used to increase the survivability of our satellites along with their communication links and ground stations. These efforts to implement a space systems survivability are consistent with the strategy and policy developed under the Air Force Space System Architecture. In Fiscal Year 1985, we will continue these efforts to develop long-term survivability requirements.

The Space Defense System program is continuing the development of an operational antisatellite capability to deter Soviet antisatellite use and, if necessary, to enable us to negate hostile space systems that provide support to hostile military forces. In Fiscal Year 1985, partial testing of the low-altitude, air-launched miniature vehicle antisatellite capability will be followed by production.

Command, control and communications are vital to effective integration, coordination, and management of all space defense resources. The North American Aerospace Defense Cheyenne Mountain Complex Space Defense Systems program will develop the Space Defense Command and Control System in a phased approach to support the evolving space defense elements. During Fiscal Year 1985, the Space Defense Operations Center phased development will continue. A fully automated capability is being developed to support our space surveillance and space defense program.

The Defense Support Program (DSP) is a key element of our nation's strategic defensive posture. This program provides data to the National Command Authority, North American Aerospace Defense Command, and Strategic Air Command. Our development efforts are aimed at increasing the survivability of operational data by designing ground station modifications for compatibility with the survivability improvements of follow-on satellites, and ensuring that these satellites are compatible with the space shuttle.

To maintain the operational capability of this vital system, new satellites must be procured to replace those that have failed, worn out, or are unable to meet the growing threat. To meet near-term requirements, four DSP satellites have been procured, two in Fiscal Year 1983 and two in Fiscal Year 1984. In Fiscal Year 1985, we will continue integration of DSP satellites in the space shuttle and continue ground station compatibility modifications. In addition, we will complete testing on all mobile ground terminals.



Defense Support Program Satellite

President Reagan's Strategic Defense Initiative, announced to the nation in March 1983, calls for a research program to counter the Soviet ballistic missile threat with measures that are defensive. In response, the Department of Defense is defining a long term research and development program to explore the key technologies needed for an effective ballistic missile defense.

The ultimate goal of the program is to develop a base of proven technology that can lead to a defensive system that will destroy Soviet ballistic missiles during their launch and boost phase and reentry vehicles during the mid-course and terminal phases of their flight.

The Strategic Defense Initiative research and development program is focused on technology development in areas that cover all aspects of a future multi-layered defense system such as surveillance and tracking, weapons, systems analysis and battle management, command, control and communications, and system support. In Fiscal Year 1985, several ongoing Air Force programs will be integrated into the Strategic Defense Initiative, being managed by the Office of the Secretary of Defense. Future Air Force efforts to develop ballistic missile warning, space surveillance, and space and ground-based laser technologies will be conducted under the Strategic Defense Initiative to meet a broader range of national mission requirements.

During the 1980s, experiments and demonstrations will be conducted to assess the feasibility of applicable technologies and to support development decisions in the 1990s. By pursuing a vigorous research and development program, the United States could have an opportunity to deploy a highly effective system in the early years of the 21st century.

SPACE LAUNCH AND OPERATIONS

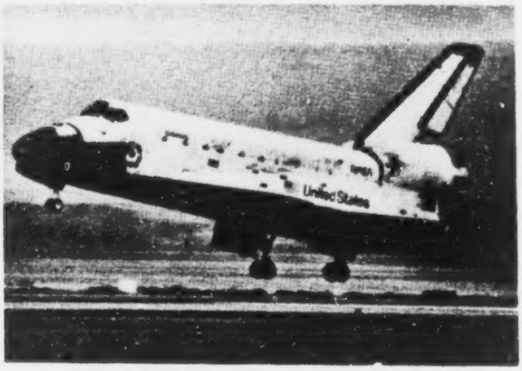
To support U.S. space operations an infrastructure of launch and on-orbit control facilities is required. Space systems have become an integral part of our military forces and survivability of that infrastructure has become a critical part of our planning and development activity.

The Space Transportation System (STS) is a national program approved by the President in 1972 to provide U.S. Government and commercial users, as well as foreign users, routine access to space. The STS consists of the Space Shuttle, upper stages, Spacelab, launch and landing facilities, and mission control facilities. The National Aeronautics and Space Administration (NASA) is responsible for developing and operating the Shuttle.

The Air Force is the Department of Defense executive agent for military applications of the Shuttle and is responsible for: developing and operating the Inertial Upper Stage (IUS); jointly developing with NASA a common short Centaur G upper stage; acquiring and operating the Western Launch Site at Vandenberg Air Force Base; and acquiring and operating the dedicated military control center, the Consolidated Space Operations Center. Our Fiscal Year 1985 research, development, test and evaluation (RDT&E) and procurement funding requests in the Space Shuttle program are required to continue activation of the Vandenberg Air Force Base launch site and to complete recovery actions to fix problems identified in the initial IUS Shuttle flight.

Construction of the Vandenberg Air Force Base launch facility is progressing on schedule for a first launch in 1985. The IUS was launched twice in Fiscal Year 1983. The first was an extremely successful mission aboard a Titan III (34)D launch vehicle. Unfortunately, the second launch was an unsuccessful mission aboard the Shuttle. The IUS did not place the NASA-sponsored Tracking Data Relay Satellite (TDRS) into its mission orbit.

Through a series of satellite thruster firings, NASA was able to reposition the TDRS into the correct orbit; we expect no degradation to the projected life of the satellite as a result of this IUS anomaly. We believe we have identified the problems with the IUS and are aggressively implementing fixes to make the IUS flight-ready again. We expect to resume normal launch operations in the summer of 1984.



Space Shuttle

Our Space Launch Support Program funds Department of Defense Shuttle operations including Vandenberg Air Force Base, the orbiter flight charge reimbursements to NASA, and procurement of the Centaur, IUS, and Payload Assist Modules Delta Class (PAM-D) payload vehicles for all Air Force space programs. The Centaur supports 10,000 pound class payloads, the IUS 5000 pound, and the PAM-D 3000 pound. In Fiscal Year 1984, procurement funds are being used to continue the PAM-D multiyear procurement in support of the NAVSTAR GPS program, to modify IUS vehicles as a result of the IUS anomaly, and to provide logistics support for the IUS and Vandenberg launch sites.

Our Fiscal Year 1985 procurement request will be used to continue the PAM-D block buy, to initiate long lead procurement of two IUS vehicles to be fully funded in Fiscal Year 1986 and to continue logistics support activities. Our Fiscal Year 1985 RDT&E request will be used to complete an IUS vehicle and to prepare for the procurement of one Centaur vehicle to be funded in Fiscal Years 1985, 86, and 87 for the MILSTAR program. Our decision to use the Centaur for the MILSTAR program is based on the need for payload performance margins which cannot be provided by the IUS.

Our Space Boosters program procures and launches Titan III (34)D Expendable Launch Vehicles (ELVs) and refurbishes and launches Atlas E ELVs for this purpose. We terminated Titan III production in Fiscal Year 1983 after the successful initial operational capability of the Space Shuttle. We will continue to launch our remaining ELVs to meet our scheduled requirements. The last Titan III is scheduled for launch from Cape Canaveral Air Force Station in Fiscal Year 1985 and from Vandenberg Air Force Base in Fiscal Year 1988. The last Atlas E will be launched in Fiscal Year 1989. Because of our need for assured access to space, in Fiscal Year 1985 we will continue integration studies of Department of Defense unique launch requirements, including use of commercial ELVs and heavy-lift vehicles to supplement the shuttle.

The Air Force provides some on-orbit control for Department of Defense satellites from the Satellite Test Center (STC) at Sunnyvale Air Force Station, California, through a worldwide network of seven geographically dispersed tracking stations. The current computer system in the Satellite Test Center is obsolete and its continued use will severely limit our current operations.

In Fiscal Year 1985, we will continue development and acquisition of the Satellite Control Facility (SCF) Data System Modernization program, which will correct operational limitations, give us the ability to operate the more sophisticated satellites now in development, and form the core configuration for operations at both the Satellite Control Facility and the Consolidated Space Operations Center. Data System Modernization computers will be installed in the Consolidated Space Operations Center for the complementary satellite operations there. Our Fiscal Year 1985 funds will also continue development and acquisition of the Advanced Remote Tracking Station which will replace or refurbish the existing remote tracking stations and complement the Data System Modernization.

Our Fiscal Year 1985 request allows us to continue work on the new Consolidated Space Operations Center (CSOC). For management, operational and economic efficiencies, CSOC combines two major space missions for the Department of Defense—satellite control and Space Shuttle military operations. The CSOC consists of a Satellite Operations Complex, which will share part of the satellite control workload with the Satellite Test Center, and a Shuttle Operations and Planning Complex, which will provide flight planning and readiness support, and conduct operations for military Shuttle missions.

In the role of satellite control, the CSOC will enhance our operational capabilities by providing greater mission flexibility and increased survivability. The Satellite Test Center and the CSOC will provide mutual emergency backup for mission essential functions should outages occur at either center. In its Space Shuttle role, the CSOC will directly control the Department of Defense Shuttle missions, and provide enhanced security protection. During early Shuttle operations, control of Department of Defense Shuttle missions will be performed by the NASA Shuttle control facility at Johnson Space Center. As the CSOC becomes operational, it will relieve the Johnson Space Center of full launch responsibility of the increased space shuttle flights. Survivability will also be increased by having two facilities, with Johnson Space Center serving as the backup to CSOC for Department of Defense missions.

In Fiscal Year 1985, the CSOC Technical Building and the Central Plant will be completed and the remaining facilities will be nearing completion. RDT&E and procurement funds will continue acquisition of technical systems for satellite and Shuttle control, network communications, the operations command center, and support training programs. Some of the procurement funds will also be used to purchase the initial logistics spares to support the scheduled start of live CSOC operations beginning in Fiscal Year 1986.

We are committed to maintaining the technical superiority of our space systems by testing new concepts and by investigating the effects of the space environment on our systems. The tri-service Space Test Program (STP) supports this objective by providing spaceflights for Department of Defense research and development experiments that gather information critical to the development of future space systems, including development of the Shuttle as a manned space laboratory. Fiscal Year 1985 STP funding supports the spaceflight of three primary experiment missions and 15 secondary payloads including some that will be performed on the aft flight deck and mid-deck of the Shuttle.

There is a range of military missions which will require the capability of manned operations in transatmospheric and low earth orbit regimes. In Fiscal Year 1985, we plan to conduct alternate configuration studies against military mission requirements to define those limiting technologies that must be developed if we are to obtain the capability to conduct transatmospheric and orbital missions. Our Advanced Military Spaceflight Technology program will develop these and other technologies, making them available for a military spaceflight system in the mid 1990s.

SECTION III

READINESS AND SUSTAINABILITY

In our Fiscal Year 1985 budget submission, we continue to place priority emphasis on improving the combat preparedness and staying power of our forces. Investments in readiness and sustainability will ensure that our forces are ready for combat on short notice and capable of sustained military operations should deterrence fail.

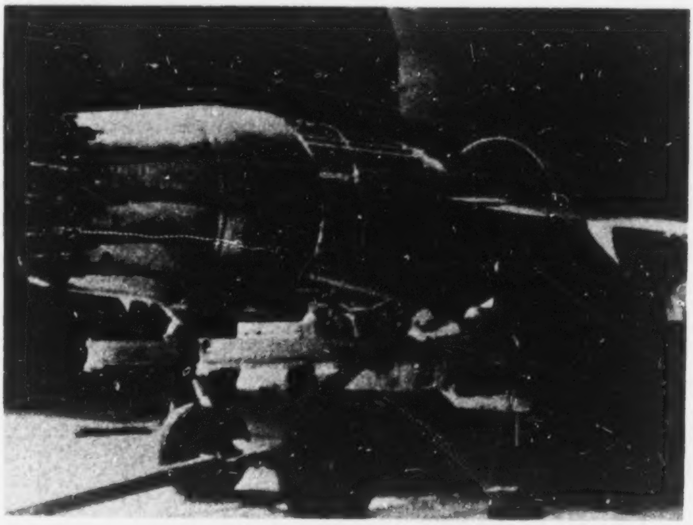
This section discusses aircraft and missile spares and repair parts, simulators and trainers, modifications, war consumables, and aircraft common ground equipment. However, these items represent only some of our readiness and sustainability needs. Additional requirements, such as ammunition, bombs, bare base equipment, vehicles, fuel, other procurement equipment spares and repair parts, depot maintenance and military construction, are reflected in other appropriations.

The availability of spare parts is the most significant determinant of Air Force readiness and sustainability, and historically the greatest limiting factor. Following the conflict in Southeast Asia, the Air Force faced declining budgets and the need to modernize and increase force structure. The introduction of new aircraft weapon systems was accomplished at the expense of not fully funding our spares accounts. Shortfalls developed and the adverse impact on military operations increased significantly. As these new assets entered the inventory, our replenishment spares requirement began to grow; at the same time, inflation and lower weapons system quantity buys caused the price of spares to spiral upward. Consequently, funds programmed for spares in the early 1980s were inadequate because of both the growth in requirements and the increase in weapon system prices. Beginning in Fiscal Year 1981, the Air Force established readiness and sustainability objectives and funded these objectives in its budget. Although the Air Force clearly emphasizes the funding of spares, we are still living with the legacy of underfunding.

AIRCRAFT AND MISSILE SPARES AND REPAIR PARTS

Adequate funding of aircraft and missile spares is vital to peacetime readiness and wartime sustainability. Our spares procurement program consists of two distinct elements--initial spares and replenishment spares.

Initial spares include items peculiar to a weapon system that are required to support early operations of newly delivered aircraft and missiles. The initial spares account also funds all spare engine requirements, initial support of simulators, modifications, and ground support equipment. The funding required for initial spares is directly related to the number and complexity of the weapon systems and modification programs being introduced. Included in this request are spare parts, engines, and modules for F-15 and F-16 fighters, the cornerstones of our tactical forces. In addition, our Fiscal Year 1985 request includes emphasis on the B-1B, the Peacekeeper, and C-5B programs.



F100 Engine

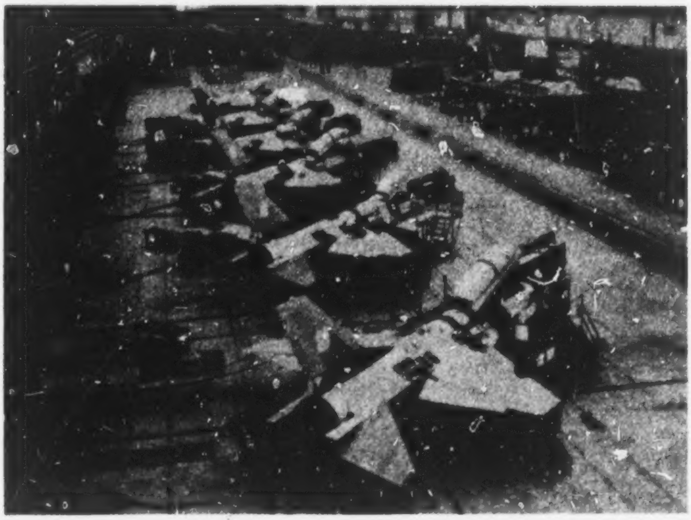
Replenishment spares are required to provide continuing support for the life of our weapons systems. We divide our replenishment spares into two categories--Peacetime Operating Stock and War Reserve Material which includes War Readiness Spares Kits/Base Level Self-Sufficiency Spares, and Other War Reserve Material.

Peacetime Operating Stock supports the peacetime objectives of the Air Force to train our combat forces, support day-to-day operations and ensure our weapon systems are ready to perform their wartime mission.

War Reserve Material (WRM) are mostly the same items as Peacetime Operating Stock except the stockage requirements are higher to support wartime levels of activity. WRM inventory is comprised of two segments, prepositioned and prestocked. The prepositioned segment is identified as War Readiness Spares Kits/Base Level Self-Sufficiency Spares (WRSK/BLSS) and is required to be in position before hostilities break out to ensure timely support of designated forces. WRSK/BLSS are the stocks the Air Force uses to transition to wartime operations and to fight for the first 30 days. WRSKs are air transportable packages maintained by units to be deployed during the first 30 days of a war or contingency. BLSS are stocks designed to augment existing peacetime assets to support the initial increased wartime activity for specfic units that will fight the war in-place.

The prestocked segment, called Other War Reserve Material (OWRM), is required to sustain the forces at wartime levels after prepositioned WRSK/BLSS stocks are exhausted and until production capacity can satisfy wartime consumption, and our defense industrial base can be mobilized.

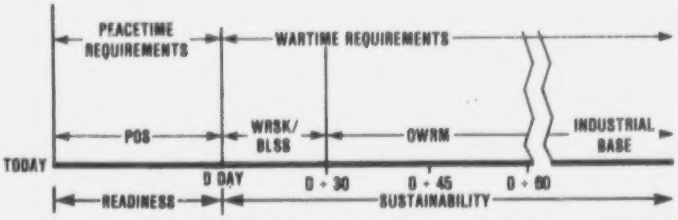
Continued support for the aerospace defense industrial base is also necessary. The industrial base's continued productivity increases will lead to less costly, higher quality, and more reliable weapons systems. Selected government investment and other incentives will stimulate contractor re-capitalization for modernization. This, in turn, will increase the capability and capacity for industrial surge and sustainability for military material resource requirements.



F-16 Production Line

The following figure provides a general idea of the relationship between readiness and sustainability. Readiness is the capability of forces, units, weapons systems, and equipment on-hand to accomplish assigned missions. It is achieved through realistic operational training, maintaining elements of the force at a high proficiency level, and ensuring each unit has sufficient spares to begin combat. Readiness is the basis of our capability to meet the wartime requirement. It is important to note that the steep incline in the readiness side of the chart is a materiel generation period required to bring our forces to a combat ready posture. To achieve this posture, withdrawals from our war reserve material inventory are necessary. Since war reserve material is intended for wartime sustainability these withdrawals impact on sustainability, unless they can be replaced through industrial surge and mobilization.

READINESS & SUSTAINABILITY
(CAPABILITY PHASES)



Sustainability is the "staying power" of our forces to fight during and beyond the initial period of combat. Sustainability is our ability to replace those resources consumed or attrited during combat by having the ability to generate adequate spares, supplies, munitions, and fuel. Sustainability is a function of peacetime stocks, the support infrastructure, war reserve material, and industrial production.

Our aircraft replenishment spares budget request in Fiscal Year 1985 represents a balanced approach between modernization and improvements to readiness and sustainability. We are improving our methods of forecasting the funds required to support our spares requirements in the year of execution. With this budget request, we expect to make progress toward correcting our previous spares shortfalls as we progress toward achieving the full combat potential of our weapon systems.

Our missile spares and repair parts have received an adequate level of funding in the past several years, and as a result, we have continued to enjoy high mission capable rates in the missile program. Continued Congressional support is vital to the progress we have made in upgrading logistics support to our missile forces and maintaining high mission capable rates.

SPARE PARTS ACQUISITION

The Air Force is aggressively implementing the Secretary of Defense's ten-point program to increase competition and to ensure a fair and reasonable price is paid for every part. Although we currently have programs in place that identify overpricing, we are expanding these efforts and are taking other actions to improve our procurement practices.

The grass roots effort of Air Force programs to prevent paying unreasonable prices for spares is Zero Overprice. This Air Force-wide program was instituted in March 1979 to encourage and reward Air Force personnel who identify and report prices of goods and services suspected of being unreasonable. Even outside of the Zero Overprice program, our people have been identifying, reporting and correcting overpricing. The Air Force is developing an Air Force-wide publicity campaign to increase emphasis on the Zero Overprice program.

The Air Force's largest buyer of spare parts, the Air Force Logistics Command, has launched a major initiative against unreasonable spare parts price increases with Pacer Price. This program will institutionalize a pricing control procedure that will result in buying smarter and more effectively. Pacer Price is a major Air Force initiative involving an in-depth study of the spare parts pricing process during provisioning, acquisition, and replenishment. The program brings together a team of engineers, manufacturing estimators, price analysts, small business people, and a person called the "competition advocate" to examine items being bought each year. This examination includes "should cost" evaluations, application of parameters to determine exceptional price growth, and a review of the standard Air Force pricing systems to ensure the accuracy of catalog prices.

The Air Force is also attacking the overpricing problem through increasing competition. Competition reduces prices; therefore, the Air Force is committed to encouraging competition in every way possible. We have two major programs underway to increase competition.

Our competition advocacy program within Air Force Logistics Command and the Air Force Systems Command is improving the Air Force's competitive performance. The program establishes competition advocates, who try to define and eliminate the major impediments to competition. They are also actively involved in reviewing the acquisition and management of technical data, and the competitive breakout of spare parts. In addition, they are currently tracking the reporting of competitive and noncompetitive Air Force contracts.

Our other major program, the Department of Defense Spare Parts Breakout Program, which identifies parts that can be procured competitively or from actual manufacturers rather than the prime contractor. This program has accomplished much since it was established in 1969. In the future, we expect the Department of Defense Spare Parts Breakout Program to increase competition among Air Force contractors, reduce sole source procurements, broaden the industrial base and lower prices for spare parts. In addition, the Air Force has changed its regulations to ensure that the government obtains unlimited rights to technical data not later than five years after delivery of the first production item. This provision is mandatory in all future solicitations and contracts that involve significant numbers of spares or large expenditures of funds for spare parts. The regulation change is being reviewed at the request of the Office of the Secretary of Defense.

The Air Force also established an Air Force Management Analysis Group (AFMAG) for spare parts acquisition. The AFMAG was established at the direction of the Air Force Chief of Staff to perform an independent analysis of the spare parts acquisition process and to identify those situations that prevent the Air Force from paying fair and reasonable prices for spare parts and from increasing competition. The AFMAG short term focus is to take actions that will impact the Fiscal Year 1984 spare parts buy and to ensure a reasonable price on every item through increased competition. Its long term focus is to enhance these actions with computerized tracking, better financial management, and improved weapons system management of technical data.

We believe that with these management programs, we will have a more modern, efficient spare parts acquisition system that will contribute significantly toward providing this nation with the best possible warfighting capability.

SIMULATORS AND TRAINERS

To maintain peacetime readiness and prepare for wartime, our aircrews must be just as ready as the equipment they fly. To achieve a high level of combat readiness, aircrews must practice under simulated combat conditions. The training must be rigorous and realistic so that crew members can exploit the full potential of their weapon systems. The Air Force flying hours program, managed under the Operations and Maintenance appropriation, yields one of the highest readiness payoffs. Supported by sufficient spares, these training missions and exercises pay off in a more effective combat capability and lower accident rates.

Achieving a high state of mission readiness through improved training is the primary objective of the Air Force Flight Simulator program. The most important return we expect from modern simulator investments is to attain combat mission readiness through training in a more efficient and effective manner. However, simulation is only a complement to "in-flight" proficiency training. Simulators are used to train safety-of-flight tasks, such as emergency procedures, that require repetition or flight conditions that are difficult or not prudent to achieve in the aircraft. Also, we use simulators to train those war fighting tasks that cannot be easily trained in the aircraft because of equipment, range, or airspace limitations.

With the right combination of flight simulators and aircraft, we intend to: maintain and improve the combat readiness of experienced aircrews; provide effective initial and continuation training for other less experienced pilots and aircrew members; and conserve scarce resources such as energy and weapons. We believe that the proper mix of flying hours and simulator time will result in more proficient aircrew members. Under wartime conditions those crew members should have lower airframe and aircrew loss rates.

B-52 Weapons System Trainer

We have many simulators now in the field, including those for the F-15, A-10, C-5, B-52, C-130, C-141, KC-10, E-3, T-37, F-16, KC-135 and T-38. We have funds programmed in Fiscal Year 1985 to continue to procure Operational Flight Trainers for the F-15, F-16 and the C-5B. Also in Fiscal Year 1985, we plan to initiate procurement of the C-5/C-141 Aerial Refueling Part

Task Trainers, the B-1B Weapon System Trainer, and to procure the second EF-111A Operational Flight Trainer. In addition, we will begin development of LANTIRN simulation, the GBU-15 Part Task Trainer and the T-46A simulator.

The Air Force expects to continue its flight simulator program for new systems such as the C-17 and the Advanced Tactical Trainer. We are also initiating efforts to upgrade existing systems in the field to extend their useful lives and improve their supportability.

In order to meet pilot training requirements without reducing quantity or quality, we must replace the aging, operationally deficient T-37. The T-46A Next Generation Trainer will have twin engines, side-by-side seating, and a pressurized cockpit. In addition, the T-46A will have significant improvements over the T-37 in performance, maintainability, and reduced noise. We are requesting funds to procure ten aircraft in our Fiscal Year 1985 budget request.

U.S. AIR FORCE

T-46A Next Generation Trainer

MODIFICATIONS

With fewer new aircraft being produced, we are keeping our inventory aircraft far longer than before. New capabilities to cope with the changing and increasing threat are provided through modification of existing aircraft. For instance, we are well underway in the EF-111 production program to provide tactical jamming capability. A large part of our tanker shortfall will be alleviated when we complete the reengining of the KC-135 to increase its fuel offload capability. The B-52 is being upgraded with a new offensive avionics system, cruise missile capability, and improved electronic countermeasures. For selected B-52Gs we are providing Harpoon carriage for a maritime role.

Our modification program also includes structural modifications to extend aircraft life consistent with longer retention. Wing modifications are on-going for the C-5, C-130, and the KC-135 fleet.

Another problem with aging aircraft is the requirement to replace tube-type avionics and analog computer technology with modern, reliable systems. B-52 radars and flight control systems, F/FB-111 avionics, RF-4 radar, and numerous common systems such as radios, radar altimeters and air data computers are a few of the many modifications underway to solve supportability problems and to provide improved reliability.

WAR CONSUMABLES

The War Consumables program provides such things as external fuel tanks, bomb racks, adapters and pylons. They are procured as replacements for those items which would be jettisoned from aircraft under wartime conditions. The majority of the funds in this year's war consumables' request are for F-16 external fuel tanks. These tanks are used to extend the range of the basic airplane for long range missions. While carrying these tanks, maneuverability is reduced and drag increased. The external tanks are jettisoned in combat to restore maneuverability and to lower drag.

Two different tanks are being procured: a 300 gallon fuselage tank and a 370 gallon wing tank/pylon. Both tanks are being procured on multiyear contracts. The request also includes funds for Maverick, High Speed Antiradiation Missile, and Advanced Medium Range Air-to-Air Missile launchers, and F-4 external fuel tanks. All programs are structured to meet our minimum outyear sustainability goals.

AIRCRAFT COMMON GROUND EQUIPMENT

The Common Ground Equipment program is a key factor in the overall readiness and sustainability posture of our air forces. It provides those items necessary to maintain, service, and test aircraft and their components. These items are used throughout the Air Force logistics complex--on the flight line, in base maintenance shops, and at the centralized maintenance activities.

Approximately half of our Fiscal Year 1985 budget request for aircraft common ground equipment provides equipment for new aircraft entering the inventory. The remaining portion of the request is for equipment replacement and war reserve material build-up to support rapid force deployments.

Continued support is imperative in the area of readiness and sustainability. These programs are designed for steady, incremental growth. Any significant disruptions will shift the balance of our military capability posture and compound the problems we are striving to overcome.

SECTION IV

FORCE PROJECTION

AIRLIFT

Mobility forces--airlift, sealift, and prepositioning--are essential to our force projection strategy because they provide the link between force structure and combat capability. Economic and political realities will not allow the stationing of troops and equipment in every geographical area where our vital interests may be challenged. Our conventional war strategy relies on our ability to rapidly deploy combat forces from bases in the continental United States to areas of crisis and to sustain combat units for as long as needed. Our military power means little, from either a deterrent or a warfighting perspective, if it cannot be projected in time to meet a threat.

During the critical early phases of a conflict, only airlift has the responsiveness and flexibility to meet mobility requirements in the days or weeks before the first sealift deliveries begin. In some cases, even a small force quickly applied at the right place may deter the outbreak of conflict, or failing that, turn the tide of battle.

Sealift provides the greater load capacity needed for follow-on force buildup and sustaining support, but lacks the responsiveness and flexibility of airlift. In addition, some areas are not accessible to sealift, so airlift is required to move time urgent items from secure seaports to crisis areas.

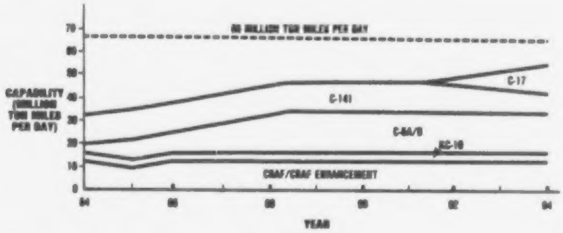
Prepositioning greatly increases our combat potential in selected regions; however, high levels of forward prepositioning reduce operational flexibility. For prepositioning to be fully effective, troops and support equipment must be airlifted to join up with the prepositioned material before the conflict starts, thus increasing the need for airlift in the early days of a conflict.

The evolving threat and the growing ability of the Soviets to attack with little warning have pushed demands for airlift well beyond the capabilities of our current forces. The projected short warning time prior to an attack on Western Europe has placed an even greater premium on speed for a NATO deployment. A rapid and sufficient airlift capability could prevent substantial losses and avoid an escalation of hostilities. In other areas of the world, where warning times may be equally as short, the airlift requirements for the deploying force could be even more demanding than for a NATO deployment. In fact, airlift for rapid deployment is currently a limiting factor in our conventional war strategy.

The improved combat capability of potential enemy forces has compelled our ground forces to increase the size, weight, and total numbers of their heavy mechanized firepower items. The majority of Army and Marine Corps firepower equipment is outsized, that is, too large to be carried on any current airlifter except the C-5.

Airlift capability is provided by C-130, C-141 and C-5 aircraft in active duty, Reserve and Air National Guard units, and cargo and passenger aircraft that are in the Civil Reserve Air Fleet. Since 1974, 17 studies, including the Congressionally Mandated Mobility Study, have examined our strategic mobility requirements and have documented deficiencies in our defense mobility posture. The Air Force Airlift Master Plan provides for intertheater capability as shown below. The long term level of intertheater airlift capability recommended by the Congressionally Mandated Mobility Study is 66 million ton miles per day.

INTERTHEATER AIRLIFT MASTER PLAN



Our overall airlift enhancement strategy is divided into three parts: improvements to existing forces, near term capability increases, and attaining the long term level of capability recommended by the Congressionally Mandated Mobility Study. Our request for Fiscal Year 1985, in research, development and procurement remains committed to correcting these deficiencies.

We have programs underway to improve the readiness, sustainability, and capabilities of our current airlift systems. These programs include increasing spare parts stocks and crew ratios to permit higher utilization rates of our C-5 and C-141 aircraft, increased aerial port personnel and airlift support equipment, and upgrading Military Airlift Command C^3 systems. The C-5A wing modification will extend the lifetime of this system by 30,000 flying hours. C-130B and early model C-130E aircraft are also undergoing a wing modification which will allow these aircraft to continue flying into the 21st century.

Another of our problems has been the chronic and significant shortfall in our capability for long-range airlift of oversize and bulk cargo. To help correct this shortfall we recently completed the C-141 stretch program to extend the fuselage and add an air refueling receptacle. The stretch increased this aircraft's pallet capacity by 30 percent and resulted in more efficient use of the airplane. In addition, the C-141 is receiving a service life extension to 45,000 hours. In Fiscal Year 1985, we will also continue needed C-141 improvements to several on-board systems, such as station keeping equipment, which enables us to deploy and employ a brigade-size airborne force in adverse weather.

Even with the enhancements planned for our existing forces, we will still have serious shortfalls in our capability for intertheater airlift. For the near term, we are procuring additional KC-10s and the C-5B to provide substantial improvement to the U.S. defense mobility posture. In addition, we are engaged in a modification program to increase the cargo capability within the Civil Reserve Air Fleet by adding cargo convertibility features to wide body 747 passenger aircraft. We are also procuring three C-19 aircraft (Boeing 747s) for the Air National Guard. These four programs--KC-10s, C-5Bs, Civil Reserve Air Fleet enhancement and C-19s--will increase our present capability by 15.4 million ton miles per day. Since the KC-10 and the C-5A aircraft are in the Air Force inventory, existing training and support elements will allow the new KC-10 and C-5B aircraft to transition quickly to operational status.

The air-refuelable C-5 has an intercontinental range and can carry all the major firepower and equipment items of our modernized ground forces. It is the only aircraft presently capable of transporting key outsize firepower equipment needed by the Army and Marine Corps to respond to worldwide contingencies. Our in-service fleet of 77 C-5A aircraft is not adequate to meet these outsize cargo needs. We plan to increase the C-5 force to 127 aircraft by procuring 50 C-5Bs through Fiscal Year 1987. The C-5B will be the original C-5 design, updated with all currently approved engineering change proposals, a 30,000 hour service life wing, modernized TF39-1C engines, improved avionics, and more durable and corrosion-resistant aluminum alloys.

By acquiring C-5Bs, we will be able to begin promptly to correct the serious intertheater shortfall in our outsize cargo airlift capability by improving our ability to transport large volume, heavy weight cargo over intercontinental distances. Acquisition of C-5Bs will enhance our ability to rapidly project combat forces worldwide. In Fiscal Year 1985, we are requesting funds for procurement of ten C-5B aircraft.

C-5B Galaxy

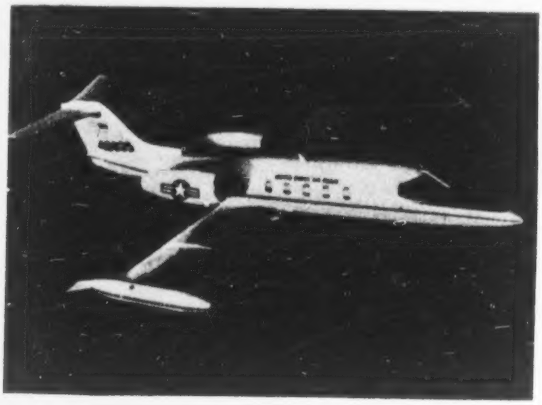
For the long term, the C-17 is a key element in the Air Force Airlift Master Plan that addresses the overall airlift shortfall, modernization requirements, and capability voids of the current fleet. This rugged, reliable airlifter will incorporate proven low risk technology to operate efficiently over intercontinental distances, and into and out of the small, austere airfields typical of contingency areas around the world. The air-refuelable C-17 will provide a full spectrum of delivery modes--airland/airdrop of outsize cargo, low altitude parachute extraction, and rapid combat offload.

C-17A Airlift Aircraft

The C-17 is the capstone of the airlift improvement program. It is planned to provide three vitally needed capabilities. First, it contributes to the completion of the recommended increase in intertheater airlift capability stated in the Congressionally Mandated Mobility Study. Second, it provides the theater commander with outsize intratheater capability. Third, it will replace the lost capability when some C-130s and the C-141s reach the end of their service life in the 1990s. The Air Force request for Fiscal Year 1985 will start full scale development leading to initial procurement in Fiscal Year 1988. Initial operational capability is planned for Fiscal Year 1992.

The Civil Reserve Air Fleet Enhancement Program is designed to encourage airlines to add cargo-convertibility features to their wide-body passenger aircraft. The Department of Defense pays for the modification and resulting additional operating cost due to the increased weight. In return, we get a much needed increase in bulk and oversize cargo airlift capability at a total life cycle cost that is less than one-sixth that of organic ownership. In Fiscal Year 1985, we are requesting funds to modify four B-747 aircraft.

Other key mobility programs include the CT-39 replacement, now the C-21/C-12 program, and C-140 replacement, now the C-20 program. The C-21/C-12 program addresses the need to replace the existing CT-39 Operational Support Airlift fleet because of aircraft age and escalating maintenance costs. The wartime mission of these aircraft is to provide time sensitive command and staff movements, courier intelligence information, transport hospital supplies, fly medical evacuation missions, provide a small parts resupply capability, and transport returning prisoners of war to debriefing facilities.



C-21 Operational Support Airlift Aircraft

In peacetime, C-21/C-12 aircraft provide low cost pilot flying experience. In Fiscal Year 1985, we are requesting funds to continue the lease of C-21/C-12 aircraft.

C-12F Operational Support Airlift Aircraft

The Air Force has 11 C-140B aircraft which are used to transport high ranking government officials and foreign dignitaries in the United States and Europe. The C-20 program will replace these aircraft by Fiscal Year 1988.

C-20 Operational Support Airlift Aircraft

During Fiscal Year 1983 and 1984, we leased three C-20 aircraft. In Fiscal year 1985, we are requesting funds to procure the first three of a planned buy of 11 C-20 aircraft.

AERIAL REFUELING

Along with airlift, aerial refueling is essential to successful deployment operations. We are planning a force of 60 KC-10As and will complete procurement by Fiscal Year 1987. Our Fiscal Year 1985 request includes eight aircraft. The KC-10As will greatly improve the Air Force capability to support contingency operations, reduce our dependence on foreign bases, and enhance our capability for the rapid deployment of combat forces. Airlifter cargo loads can be greatly increased and delivery times to destination reduced through use of the KC-10A because of its large fuel offload and long range capabilities. The KC-10A also can carry considerable amounts of cargo. In addition, the KC-10A will make more KC-135 tankers available to support the strategic bomber force. KC-10A aircraft are being procured using a multiyear procurement contract which provides substantially lower prices than those on comparable commercial sales.

KC-10A Airlift/Tanker Aircraft

A key component of Strategic Force Modernization is KC-135R Modernization. The KC-135 fleet, procured from 1957 to 1965, provides the backbone of USAF air refueling capability. The KC-135 airframe still has the majority of its service life in front of it, but is operationally limited by the increasingly obsolete, 1950 technology J57 engine. The KC-135R Modernization Program reengines with a fuel-efficient, high bypass turbofan engine, the CFM56, and updates or replaces 34 other key systems.

KC-135R Tanker Aircraft

The KC-135R will provide a 50 percent increase in fuel offload capability and significantly reduce the current shortfall in our air refueling capabilities. This unique program converts the proven KC-135 into a dependable performer for the future--at about one-third the cost of a new aircraft. In 1985, we plan to modernize 48 KC-135s with the CFM56 engine.

In addition, the Air Force is reengining 96 Air National Guard KC-135s with JT3D engines, using funds added to the Defense budget by the Congress in previous years. The JT3D engines, made available by the retirement of commercial 707 aircraft, provide a 20 percent increase in fuel offload capability and resolve current noise pollution problems for Air National Guard units located in urban locations.

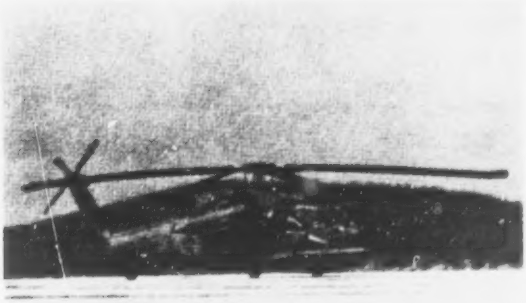
SPECIAL OPERATIONS AND RESCUE/RECOVERY FORCES

U.S. national security requires the maintenance of special operations forces capable of conducting the full range of special operations on a worldwide basis, and the revitalization of these forces must be pursued to provide an adequate and effective operational capability.

Our Combat Helicopter Modernization Program addresses the urgent need to modernize the Air Force's Combat Rescue and Special Operations Forces to cope with increasing threats and to overcome severe maintenance problems resulting from obsolete equipment. We are developing a derivative of the Army UH-60

Black Hawk--a helicopter of proven reliability, maintainability, and survivability. Using the basic H-60, we are integrating improved avionics for precision low-level navigation at night and in adverse weather, adding auxiliary fuel tanks, incorporating an air refueling capability, and installing other necessary Air Force mission equipment. The HH-60 will be operational in the active force, the Air Force Reserve, and the Air National Guard.

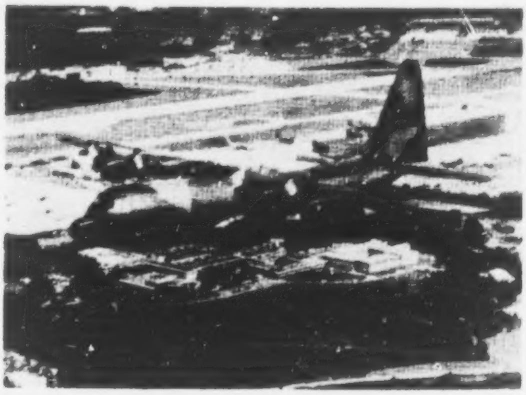
The HH-60 program is constructed with an affordable mix of 69 fully capable and 86 less capable aircraft. The fully capable version, the HH-60D, will be capable of precision low level navigation at night and in adverse weather conditions. The less capable version, the HH-60E, will not be equipped with night and adverse weather avionics, and will be limited to low level operations in visual conditions only. Together, the HH-60D and HH-60E will constitute a fleet equipped for operations in a wide variety of threat environments. Our Fiscal Year 1985 request is for advance buy to support procurement of helicopters starting in Fiscal Year 1986.



HH-60 Combat Helicopter

To increase our long range special operations capability, we are procuring MC-130H Combat Talon II aircraft. These aircraft will increase our capability to insert and resupply special operations teams which is the backbone of special operations mission.

These forces primarily support crisis response actions of a covert, clandestine or low-visibility nature. In addition, they support all levels of conflict from low intensity up through general warfare.



MC-130H Special Operations Aircraft

Our current aging force of 14 MC-130E Combat Talon I aircraft is insufficient to meet mission taskings. Our Fiscal Year 1985 request for two MC-130H aircraft and advance procurement of four aircraft continues to support our multiple theater requirements. In addition, the budget also continues the modification program to improve and upgrade the navigation and self-protection capabilities on the existing MC-130E and AC-130H gunships. To provide refueling capability for special operation and rescue helicopters, we intend to continue to modify HC-130s to a tanker configuration.

The Joint Vertical Takeoff and Landing Aircraft (JVX) program is a Department of Defense initiative to develop a common vertical takeoff and landing vehicle for multiservice use. The executive agent for the program is the Department of the Navy, and the program manager is assigned from the Marine Corps. Air Force has a valid JVX requirement for the long range special operations extraction mission. The program will take advantage of demonstrated tilt-rotor technology and promises to reduce total Department of Defense costs through a common development program. While the Navy will fund the basic program, the Air Force will fund those aspects of the program that are Air Force unique. Our Fiscal Year 1985 request is for development of Air Force unique avionics systems on the JVX.

SECTION V

THEATER FORCES

In order to protect our national interests and the interests of our Allies, our forces must have the ability to meet conventional threats in an expanding number of regions. While Central Europe presents the most formidable array of adversary conventional forces, Southwest Asia, with its vast distances and varied environments, has created a new arena that our personnel and equipment must also accommodate. In addition, acts of aggression may overtly or covertly be exercised by the Soviet Union, Soviet satellites, or any of several hostile countries in the Atlantic and Pacific Theaters. Last year, events in Lebanon and Grenada demonstrated the global nature of our commitments.

After expanding our airlift capability, modernization and expansion of our theater forces is the next highest Air Force priority. To meet the challenges presented throughout the world, our forces must be capable, flexible, ready, and sustainable. To ensure that they are the most capable in the world, we continue to use our advantages in technology, tactics, and dedicated, well-trained people.

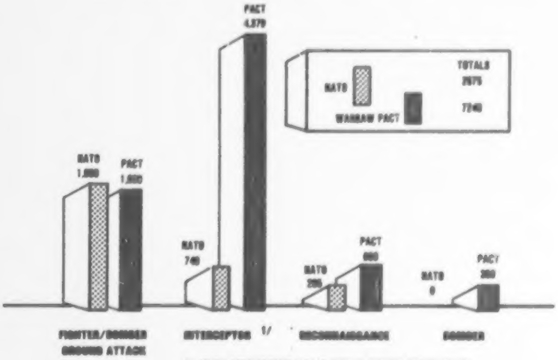
We have organized and trained our active and Air Reserve Forces as a total force. Our reserve components provide two-thirds of our air defense capability, half of our tactical reconnaissance capability, and one-third of our tactical fighter capability. Modernization of these components is essential to support this composite force, which is the backbone of our conventional military power.

As the most formidable adversary of the United States and its NATO allies, the Soviet Union has continued to outproduce the NATO countries and position its newest and most capable systems for operations against NATO forces in Europe. As an example, since 1980 the Soviets have produced over 4500 tanks, including the T-80, which are deployed with forces directly against NATO. As a result of this continuing emphasis on armor, the Warsaw Pact has built up a three-to-one tank advantage over NATO.

The Soviets have also implemented the Operational Maneuver Group. The purpose of this specialized group is to penetrate NATO defense rear areas quickly and independently of the main body of Soviet forces to destroy, seize, or disrupt such key elements as nuclear weapons, C^3 facilities, and supply lines. To support their main forces and Operational Maneuver Group operations, the Soviets have transformed their air forces from limited range, low payload defensive day fighters into a long range, offensively potent tactical air force with an increasing capability to operate in adverse weather.

In spite of slower fighter production, the Soviets are producing over 1200 new fighters a year and are beginning increased rate production of their next generation air-to-air and air-to-ground fighters. At the same time that Soviet expansion of tactical aircraft is widening the imbalance in quantitative conventional forces, the U.S. advantage in quality forces is also eroding. Although we still maintain an overall lead in high technology systems, the Soviets have made great strides in avionics and propulsion systems which could make their newest fighters, the Fulcrum and the Flanker (to be fully operational in the mid 1980s), comparable to our current F-15s and F-16s. The chart below demonstrates the Warsaw Pact quantitative advantage in combat aircraft in Europe.

NATO/WARSAW PACT COMBAT AIRCRAFT IN PLACE IN EUROPE



1/ MANY INTERCEPTORS CAN BE USED IN GROUND-ATTACK ROLES

Our program to respond to this threat in Europe as well as other potential trouble spots is based on reaching a balance between readiness and sustainability and the modernization of our tactical forces. While we currently have the best fighter and attack forces and weapons in the world, we must continue F-15 and F-16 production in order to modernize and expand our tactical air force. We also need to improve our air-to-surface, night, and all-weather capabilities in both our munitions and delivery systems to offset Soviet quantitative advantages. Improvement of our defense suppression and tactical C^3 systems and acquisition of new sensor systems are also critical to our combat effectiveness.

In addition, continued deployment of the Ground Launched Cruise Missile is necessary to help offset the Soviet advantage in theater nuclear forces in Europe. Finally, development of offensive chemical weapons will help to deter chemical and biological warfare by forcing Soviet leaders to accommodate possible, in-kind retaliation should they employ such weapons first.

TACTICAL AIR FORCES

Our tactical air forces must be able to accomplish their tasking in a timely and effective manner. They must quickly achieve air superiority so that our ground and airborne forces can operate with less disruption from enemy air attacks. They must be capable of providing offensive air support close to friendly ground forces and they must be able to interdict and destroy enemy forces as they move forward in the battlefield.

To quickly achieve and maintain air superiority, our tactical air forces must have aircraft that can detect and destroy numerically superior and comparatively sophisticated Soviet fighters and bombers. This requires effective avionics, weapons, and propulsion systems that optimize weapons employment and aircraft performance.

Since a large percentage of our munitions inventory is composed of older, less capable munitions, we have developed a Munitions Acquisition Plan to ensure we procure the proper mix of precision guided and unguided weapons. This munitions roadmap will guide us in obtaining the most cost effective air-to-air and air-to-surface munitions available. This year's budget request will continue the research, development, and acquisition of a new generation of munitions with a much higher probability of destruction. A significant characteristic of these munitions is their capability to greatly increase the kills-per-pass of each combat sortie, thereby reducing aircraft and aircrew exposure and losses.

We have also developed a Tactical Fighter Roadmap to guide our fighter procurement. The roadmap examines the types, numbers, mix, and capability improvements needed to accomplish worldwide theater tactical fighter force tasks over the next ten years. It is baselined on the composition of today's fighter force and includes improvements to the existing inventory needed to ensure continuing useful capabilities until they are phased out of the inventory. It includes the acquisition strategy necessary to meet our future force structure and capability needs.

The acquisition strategy is based on three characteristics: the required numbers of fighters to flesh out, modernize and sustain a 40 tactical fighter wing force, as well as an adequate air defense force; the right mix of fighters with the flexibility and effectiveness to accomplish specialized and multirole missions; and quality improvements for our fighters to accomplish more demanding missions in the face of the increasing threat.

Today our tactical air forces do not have sufficient aircraft to fully equip 40 tactical fighter wings with 72 combat ready aircraft each. To flesh out, modernize, and sustain a 40 tactical fighter wing force, as well as equip our air defense forces, requires a procurement of 260-280 aircraft per year.

While the total numbers are important, of equal importance is the procurement of the right mix of air-to-air and air-to-ground fighters to meet theater commanders requirements. The fighter force mix, therefore, must provide a balance of specialized fighters for the many air-to-air or air-to-ground missions, as well as multirole fighters that can be used in either mission role.

Increasing capabilities are required to meet our critical and demanding mission requirement to operate over enemy territory around the clock and in any weather. We intend to provide weapon system quality improvements to handle the most demanding air-to-air missions until the Advanced Tactical Fighter is fielded in the mid 1990s. We have also programmed quality improvements to address night, all weather and long range air-to-ground mission requirements.

Our budget request for Fiscal Year 1985 continues our progress toward establishing our required 40 tactical fighter wing force with improved capabilities. This continued progress is critical if we are to meet our limited, but economically attainable, force structure objectives for the early 1990s.

Our current air-to-air fighter force is centered around the F-15 Eagle, the best air superiority fighter in the world today.

F-15 Eagle

We will continue to improve the Eagle's combat capabilities by upgrading offensive avionics, incorporating improved self-protection measures, and providing an improved beyond-visual-range identification system. To satisfy force structure requirements for air superiority and to support a more efficient production rate, we are requesting a procurment of 48 aircraft in Fiscal Year 1985.

The F-16 Fighting Falcon is a multipurpose aircraft. In the air-to-surface role, it is becoming our primary offensive air support aircraft. In the air-to-air role, it complements the F-15 and has demonstrated superb handling and maneuver characteristics. The addition of the Advanced Medium Range Air-to-Air Missile to the F-16 weapon inventory will provide the Falcon with an all-weather beyond visual range capability. As part of a multiyear procurement, we are requesting 150 F-16s in Fiscal Year 1985 and long lead for 216 F-16s in Fiscal Year 1986. A substantial number of that buy will be used to modernize the Air Reserve Forces. We are continuing quality improvements for both the F-15 and F-16 in Fiscal Year 1985 which permit incorporation of growth systems and improved avionics which will ensure the effectiveness of these fighters well into the 1990s.

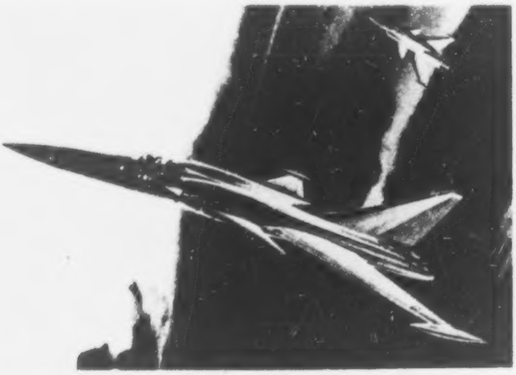
F-16 Fighting Falcon

While the F-15 and F-16 represent the major portion of our current fighter force, there remains a serious near term deficiency in delivering munitions over long-ranges and in adverse weather, day or night.

Both the F-15 and the F-16 have proven air-to-air and air-to-surface capabilities. Therefore, an evaluation was conducted to determine which aircraft could be enhanced to provide our tactical air forces with a dual role fighter which, while maintaining its air-to-air capability, would have significantly increased range and payload, as well as the ability to operate in night and weather conditions. Extensive capability and affordability analyses have been completed and we plan to announce our decision on the aircraft we will evolve to the DRF in the near future. We are requesting funds in Fiscal Year 1985 to continue the development of the necessary systems modifications and to begin advance procurement.

Another area where overall fighter and attack force capability must be improved is fighter engines. Because of the high support costs for the F100 engines currently used in the F-15 and F-16, Congress has directed that we seek more durable and reliable engines with warranties and guarantees in selected performance parameters. To achieve the best overall solution of fighter engine acquisition, we awarded one year firm fixed price contracts for procurement of F100-PW-220 engines (installation in F-15s) and F110-GE-100 engines (installation in F-16s). Future year buys will be based on deployment plans, supportability cost and Air Force requirements for F-15 and F-16 aircraft.

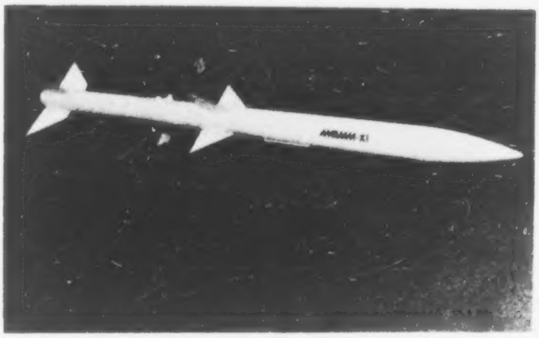
The last air superiority fighter first became operational in 1975 when the F-15 entered the inventory at Langley Air Force Base, Virginia. The Advanced Tactical Fighter is planned to be introduced



Artist Concept of Advanced Tactical Fighter in the early 1990s--a gap of almost 20 years. This gap in introducing a new air superiority fighter is unprecedented in our history. On the other hand, the Soviets have introduced two new air-to-air fighters in the early 1970s, are currently fielding three new fighters in the mid 1980s. A new generation of U.S. fighters which take advantage of new U.S. advances in technology will be needed at that time to meet the Soviet threat. In Fiscal Year 1985, funding for the Advanced Tactical Fighter program will support continued exploration of engine and airframe technology to counter the evolving Soviet threat.

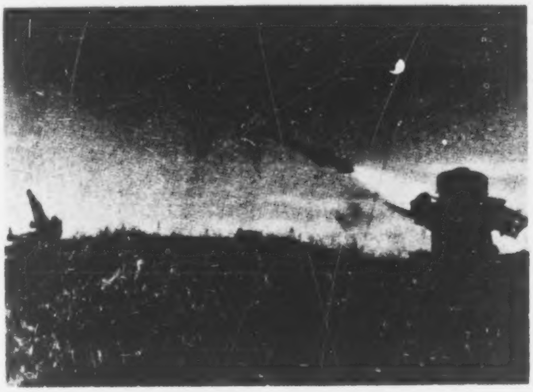
To obtain and maintain air superiority, the Tactical Air Forces require the most capable air-to-air weapons as well as quality aircraft. In Fiscal Year 1985, we will procure the AIM-120A Advanced Medium Range Air-to-Air Missile (AMRAAM) which will provide our Tactical Air Forces with a revolutionary tactical weapon.

Compared to its predecessor, the AIM-7M, AMRAAM provides increased velocity, better maneuverability, a more lethal warhead, an improved terminal guidance with an active radio frequency seeker, and a greater employment envelope. These missile characteristics, along with the capability for multiple target attacks on a single pass, and a launch and maneuver capability will increase our lethality against a numerically superior adversary and reduce the vulnerability of our aircrews.



Advanced Medium Range Air-to-Air Missile

Because of the increased interdiction capabilities of Soviet aircraft, we are improving our airbase defense in the United Kingdom against fast, low flying aircraft. We are continuing the deployment of the British-built Rapier air defense system. Under an agreement with the United Kingdom, we are procuring 32 Rapier fire units and supporting elements. The United Kingdom will man these systems for the United States. First delivery of our Rapier units began in Fiscal Year 1983. Our Fiscal Year 1985 request continues funding for the 32 units.



Rapier Surface-to-Air Missile

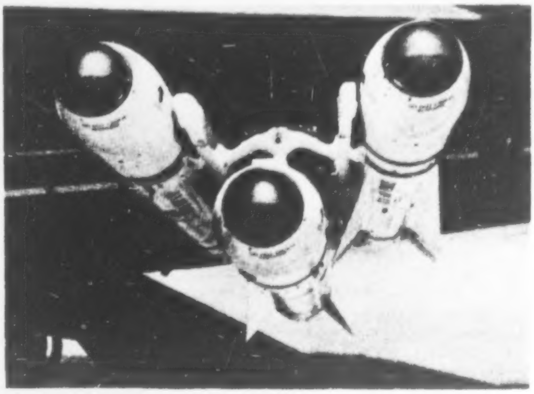
In another effort to strengthen our airbase defense, we are also continuing to acquire the Stinger surface-to-air missile to defend our airbases in South Korea. In Fiscal Year 1985, our request includes 156 Stinger missiles.

Stinger Man-portable Surface-to-Air Missile

In addition, in December 1983, the Secretary of Defense and the Minister of Defense of the Federal Republic of Germany (FRG) signed a Patriot/Roland Cooperative Air Defense Arrangement to provide air base defense for U.S. bases in Germany. As part of this agreement, the United States will procure and support 12 tactical Patriot fire units and two training/spare units for the FRG who will man and operate them at bases in Southern Germany; in return, the FRG will procure, man, support, and operate 27 Roland units for defense of three U.S. air bases.

For the Tactical Air Forces to support our ground attack forces as well as to more effectively perform interdiction and airfield attack roles, we need a complementary mix of direct attack and standoff air-to-surface weapons. Standoff weapons reduce exposure to enemy defenses and provide a capability to strike with a high degree of accuracy and destructiveness. When the situation permits, lower cost direct attack weapons are used to exploit the exceptional accuracy of our modern aircraft.

The most serious threat facing our ground forces in Europe is the potential armored threat of Soviet ground forces. To provide the offensive air support necessary to disrupt a Soviet armor attack, we are supplementing our current inventory of TV Guided Mavericks with the new imaging infrared (IIR) Maverick weapon. The increase in capability provided by the IIR Maverick includes employment in poor visibility and at night, both of which currently offer a degree of sanctuary to enemy armor movements. In Fiscal Year 1985, we are continuing IIR Maverick production.



Imaging Infrared Maverick Air-to-Surface Missile

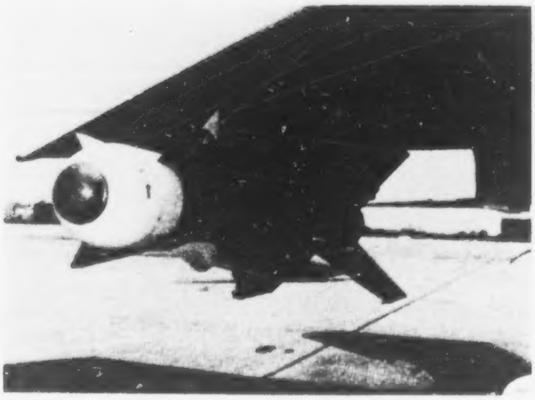
The Combined Effects Munition (CEM), CBU-87, is a 1000 pound free fall, general purpose cluster munition consisting of a Tactical Munitions Dispenser filled with over 200 Combined Effects Bomblets. The CBU-87 can be delivered at low level and at supersonic speeds. Following release, the dispenser spins up, opens, and disperses the bomblets which combine shaped charge, fragmentation and incendiary effects. In Fiscal Year 1985, we will continue production of the CBU-87.

We continue to develop and acquire new cluster munitions like the CEM and antiarmor mines such as Gator. Under the Wide Area Antiarmor Munitions (WAAM) program in Fiscal Year 1985, we are continuing development of the Sensor Fuzed Weapon which will provide a significant increase in effectiveness against armor. The Sensor Fuzed Weapon employs SKEET infrared sensor-fuzed submunitions packaged in a Tactical Munitions Dispenser.

Attacking enemy airfields continues to be a high priority. In Fiscal Year 1985, we are continuing to procure Durandals, which are French built, parachute retarded, rocket-assisted runway cratering munitions. Durandal will be our only cratering munition in the near term. Durandal can be delivered at high speed and low altitude, increasing aircraft survivability over current direct attack munitions. As a follow-on weapon to Durandal, we are continuing development of the Boosted Kinetic Energy Penetrator submunition.

For the future, we are developing standoff attack weapons and submunitions capable of attacking a variety of targets. The Joint Tactical Missile System (JTACMS) will be a long range missile capable of carrying a variety of warheads, including a submunition dispenser and a unitary warhead. JTACMS will also have the capability to attack a variety of targets. Both the Air Force and the Army have conducted extensive efforts to refine the service unique and joint requirements for this missile. The Air Force and the Army have recently signed a joint statement which confirms the status of the joint program and reaffirms the funding commitments. In Fiscal Year 1985, we will continue with the full scale development program.

The powered GBU-15 will provide a short range standoff capability to attack point and area targets with extreme accuracy. During Fiscal Year 1985, the powered GBU-15, which increases the standard GBU-15 range, will continue its full scale development in preparation for production. We also plan to improve the TV Guided GBU-15 by incorporating an imaging infrared (IIR) seeker. The IIR GBU-15 will provide an around-the-clock and limited adverse weather capability for attack of high value, heavily defended targets. In Fiscal Year 1985, we are requesting funds to start IIR GBU-15 production.



GBU-15

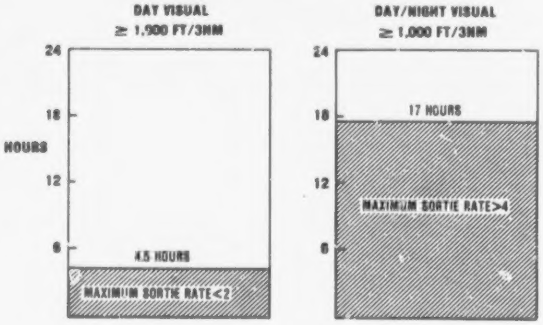
Our current laser guided bombs offer a high degree of accuracy and some standoff capability. The evolution of those weapons into the Low Level Laser Guided Bomb (LLLGB) permits delivery from low altitudes and standoff ranges, thus minimizing exposure to many of the point defenses around enemy targets, and significantly increasing the survivability of our attack aircraft. Our Fiscal Year 1985 request includes funds to continue LLLGB production.

The Tactical Air Forces have an urgent requirement to be able to employ air-to-surface munitions at night under the weather. Because day visual meteorological conditions average only 4.5 hours per day during European winters, the Warsaw Pact would have 19.5 hours per day to take advantage of our limited night operational capability to redeploy forces and move up reinforcements. Currently, only our small F-111 fleet has the capability to deliver large payloads effectively at long range, at night and in adverse weather. Development of the Low Altitude Navigation and Targeting Infrared System for Night (LANTIRN) will permit our fighters to attack Warsaw Pact targets under these conditions.

We plan to equip a portion of our F-16 and A-10 aircraft and all of our dual role fighter aircraft with LANTIRN. We expect LANTIRN will increase our sortie rates by several fold as shown in the figure below. We have requested funds in Fiscal Year 1985 for research, development, and testing of LANTIRN, as well as for production readiness.

LANTIRN EFFECTIVENESS
INCREASED SORTIE RATE/DENIES SANCTUARY OF NIGHT

CONDITIONS OF COMBAT: WINTER - CENTRAL EUROPE



Electronic combat is the orchestration of electronic warfare, command, control and communication countermeasures, and suppression of enemy air defenses. In order to successfully conduct tactical air operations, we must improve our ability to effectively disrupt, destroy or avoid enemy radars, jammers, C^3 facilities, and terminal threat weapon systems. One of the most effective ways to deal with these sophisticated defenses is with on-board radar warning receivers and electronic countermeasures equipment. Existing radar warning receivers and electronic countermeasures systems are constantly being updated to deal with the most current threat. Emphasis during Fiscal Year 1985 will be on modernization since current systems are limited in capability against advanced threats.

The Airborne Self Protection Jammer (ASPJ) is a joint Air Force/Navy program to build a common, internally mounted jammer to provide electronic countermeasures for self-protection. Our Fiscal Year 1985 request includes funds to complete developmental testing, to proceed into initial operational test and evaluation, obtain a limited production decision, and commence limited production.

While our self-protection electronic countermeasures equipment is capable of countering electronic threats in a local area, it is not designed to deal with enemy early warning and ground control intercept radars. The EF-111A electronic countermeasures aircraft is our only tactical support system capable of disrupting these radars. Our Fiscal Year 1985, request includes funds to develop system updates.

EF-111A Electronic Countermeasures Aircraft

While the EF-111A will do a good job of suppressing radars, there is still a requirement to suppress the Warsaw Pact command and control structure. The EC-130H Compass Call aircraft is designed for this mission. In Fiscal Year 1985, we plan to modify additional aircraft and improve the Compass Call capability.

The electronic countermeasures systems mentioned so far are all disruptive in nature. We have expanding requirements to enhance our destructive defense suppression capabilities known as the F-4G Wild Weasel. Attrition has reduced our existing Wild Weasel hunter-killer aircraft force to a critically low level.

To remedy this situation in the near term, we are requesting funds in Fiscal Year 1985 to convert F-4Es to the F-4G Wild Weasel configuration. In addition, we are upgrading the APR-38 Wild Weasel Receiver/Processor to provide a capability against the advanced threat being fielded by the Soviets.

F-4G Wild Weasel Defense Suppression Aircraft

Our best near term destructive defense suppression system is the F-4G with the High Speed Anti-Radiation Missile (HARM). HARM provides the Wild Weasel with the standoff capability, speed and electronic flexibility not available with its predecessors, the Shrike and Standard Anti-Radiation Missile. In Fiscal Year 1985, we are planning to procure 871 HARM missiles and modify the F-4G system to fully exploit HARM capabilities.

The Precision Location Strike System (PLSS) is a key system in our future electronic combat capability. The PLSS will provide accurate target location of enemy electromagnetic emitters in all weather conditions and in projected jamming environments. PLSS, guiding attack aircraft and weapons, will enable our combat aircraft to more effectively rollback enemy surveillance and air defense systems, providing increased survivability. In Fiscal Year 1985, we will begin PLSS production.

Accurate, rapid communications between the various elements of our theater forces essential for successful tactical operations. Because our forces will be facing a numerically superior adversary, efficient coordination between elements of our forces will be one of the keys to success on the battlefield.

Our current fleet of E-3A Airborne Warning and Control System (AWACS) aircraft has already proven its value in real world situations. As the Air Force's only airborne system capable of providing tactical warning and command and control of air operations, we are requesting funds in Fiscal Year 1985 to complete full scale development of C^3 improvements to radios and consoles and accomplish electronic counter-countermeasures improvements.

U.S. AIR FORCE

E-3A Airborne Warning and Control System

The E-3A provides a survivable, jam resistant, wide area surveillance platform that can overcome the limitations and vulnerabilities of ground based radars in dealing with airborne threats. In addition, there is a requirement to provide real time detection of ground movement of forces for attack of enemy second echelon targets. The Joint Surveillance and Target Attack Radar System (Joint STARS) has the capability to locate and track moving targets deep in enemy territory. The value of Joint STARS to the tactical commander could be comparable to the proven value of the E-3A. Our Fiscal Year 1985 funding request will permit further development of the Joint STARS radar, and incorporation of this radar into an airborne platform.

The large amounts of information generated in the tactical battlefield has led us to develop the Joint Tactical Information Distribution System (JTIDS), which will be a highly jam resistant, secure digital information distribution system between the E-3A, ground command and control centers, and some fighters. It will also be interoperable with the JTIDS of the other Services. During Fiscal Year 1985, we will continue integrating the JTIDS into the F-15 as well as developing and testing the JTIDS common message standard.

As has been proven in several Mideast wars and countless NATO exercises, it is essential for our forces to have voice communications on the battlefield in a jamming environment. Our current near term solution to the problem is the HAVE OUICK modified radio. Because we anticipate the Soviets will be developing a counter to HAVE OUICK, we will be improving our communications with HAVE OUICK II in the near term. In Fiscal Year 1985, we will begin installing HAVE OUICK II radios.

As a result of Congressional review of ultra-high frequency anti-jam radio programs, the SEEK TALK full scale development program was redirected. Technical parameters were modified, studies initiated and the Enhanced JTIDS System (EJS) selected as the best approach to the long term Soviet threat to voice communications. EJS will use JTIDS-like signal structure and waveforms, and will employ increased power. The margin of jam resistance offered by EJS will provide our forces with sufficient communications capability in high jamming environments. In Fiscal Year 1985, we will continue EJS full scale development.

The key to more effectively employing sophisticated beyond visual range air-to-air missiles is the ability to confidently identify potential targets at or beyond the ranges of these missiles. Because there are no systems presently capable of full time positive enemy identification, a highly reliable friendly interrogation system is necessary. The current system, the MK XII, is difficult to maintain and is unreliable. Several efforts are underway to improve the MK XII, but a new, secure, and reliable system is necessary. The replacement for the MK XII is the MK XV, which satisfies our requirements and is under negotiation as a Tri-Service and NATO interoperable identification system. Advance development hardware will be completed in Fiscal Year 1985 in preparation for evaluation testing.

The Joint Tactical Communications (TRI-TAC) program provides the modernized switched voice and digital data communications required by our tactical ground forces. In Fiscal Year 1985, TRI-TAC will have most of its major systems in production. These include the new AN/TRC-170 troposcatter radio, a family of digital message and voice switches and terminals, and the Communications Nodal Control Element which performs automatic technical control functions. RDT&E efforts in Fiscal Year 1985 will support the integration and fielding of these systems, the joint test facility, and design of other TRI-TAC communications equipment.

The Tactical Air Forces must replace and upgrade the surveillance and control components of the Tactical Air Control System (TACS) which are nearing the end of their useful lifetimes. To upgrade the TACS, we have worked with the Marine Corps to develop and acquire Modular Control Equipment which will enhance survivability, provide the capability to handle a significant increase in C^3 workload, enhance service interoperability, and reduce life cycle support costs. An improved ground attack capability, the Ground Attack Control Center System will incorporate modular control equipment hardware components with additional software programs to provide the TACS with the capability to more rapidly control air attacks against time sensitive mobile ground targets.

In addition to these developments, in Fiscal Year 1985, we are procuring ultra-low sidelobe antennas and testing an anti-radiation missile alarm system for the AN/TPS-43E tactical radars. These will improve the radar's jam resistance and increase its survivability against anti-radiation missiles.

The Traffic Control and Landing System (TRACALS) program converts land-based precision landing capabilities from Precision Approach Radars and Instrument Landing Systems to the international standard Microwave Landing System. By the mid-1990s, the NAVSTAR Global Positioning System and Microwave Landing System programs will enable the Air Force to phase out other radionavigation systems while improving combat capability and survivability. In Fiscal Year 1985, TRACALS continues engineering development of a tactical Microwave Landing System; it also begins programs to update its air traffic control surveillance equipment and to make its fixed based systems survivable in a combat environment. Additionally in Fiscal Year 1985, we will complete plans to competitively procure a replacement for C-140/T-39 flight inspection aircraft.

The TR-1 aircraft, a follow-on procurement to the highly successful and reliable U-2R aircraft, will provide high altitude, long endurance surveillance of the battlefield from a standoff position. The aircraft is programmed to carry the Advanced Synthetic Aperture Airborne Radar System (ASARS) and the PLSS. The TR-1 is essential to the theater commander's need for organic, enduring, near time, all-weather surveillance of enemy forces. System survivability will be enhanced by basing the aircraft at RAF Alconbury, UK, and by placing the information processing and exploitation stations in hardened underground facilities. The Fiscal Year 1985 program provides for operations and support of aircraft sensors, ground stations and associated personnel, and the procurement of three TR-1 aircraft.

TR-1 Reconnaissance Aircraft

We have a near term requirement to identify a replacement for our aging and diminishing tactical reconnaissance aircraft. While the RF-4C continues to do an excellent job, we need to find an adequate replacement to meet the expansion of worldwide requirements and attrition.

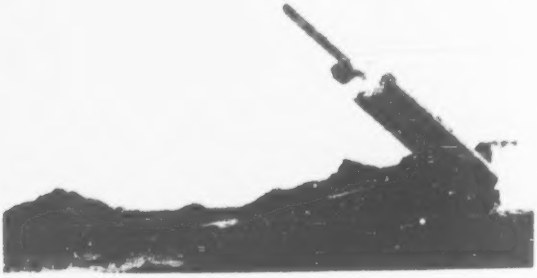
RF-4C Tactical Reconnaissance Aircraft

In order to continue to provide timely battlefield information to our theater commanders, our Fiscal Year 1985 request includes funds to continue support for identifying an appropriate RF-4C replacement aircraft as well as development of the on-board equipment necessary to accomplish its mission.

In addition to needing effective C^3 networks, we also have a continuing requirement for more complete battlefield intelligence. In the upcoming fiscal year, we are requesting funds to initiate an Advanced Tactical Air Reconnaissance System (ATARS). Our initial activities will be to review requirements, evaluate current and planned capabilities, and identify the required reconnaissance and surveillance forces mix of manned and unmanned vehicles needed to meet the threat in the 1990s.

THEATER NUCLEAR AND CHEMICAL/BIOLOGICAL FORCES

Although NATO has no intermediate range nuclear forces such as the Soviet SS-20, the deployment of the Ground Launched Cruise Missile (GLCM) in Europe will help correct the imbalance in capability between NATO and the Warsaw Pact. Operationally, GLCM gives the theater commander added flexibility by allowing our dual capable fighter aircraft to be used in a conventional role for a longer period before committing them to a nuclear role. GLCM's small radar cross-section and low altitude flight profile make it more survivable and complicates the enemy's targeting and defense problems. Our Fiscal Year 1985 budget request completes the planned RDT&E program and includes procurement funds to buy additional weapons systems and spare parts.



Ground Launched Cruise Missile

The Soviet Union possesses a considerable advantage over NATO forces in chemical warfare capabilities, which could be a decisive factor in conventional conflicts. The Soviets consider chemical warfare one of the strengths of their forces, and today, they have about 100 times more chemical munitions than the United States. They also have active chemical munitions production plants, while the United States has none.

Air Force crews flying or working in current defensive protective gear--the mask, hood, special suits, gloves and boots--would rapidly become debilitated. This condition will severely limit our combat capability and restrict overall military operations. The detrimental effects on our people due to protective gear include heat stress, restricted movement, and loss of vision and communications. Tasks which are normally difficult under combat conditions could become impossible in a chemically contaminated environment. Our people must have better individual equipment and collective protective systems to operate and survive during and after a chemical attack.

Improving our chemical defense will not by itself provide an adequate deterrent. The Soviets would enjoy a significant and perhaps decisive military advantage if they were able to force us to operate in protective equipment while their forces remain relatively unencumbered. In fact, our lack of an effective retaliatory capability could provide the Soviets with a powerful incentive to use chemical weapons. Our present capability is limited because we cannot engage and degrade second and third echelon targets with a persistent agent. Our current stocks of chemical weapons no longer constitute an adequate deterrent.

We must reestablish and maintain a credible chemical deterrent. A strong chemical defense and an adequate retaliatory capability are both essential to deterring Soviet use of chemical weapons against the United States or its allies.

Our Fiscal Year 1985 request includes funds to continue the development and procurement of new gas masks, improved protective gloves and clothing, advanced chemical agent detection and warning systems, survivable collective protection systems, and new decontamination equipment.

In addition, we must reestablish a retaliatory capability sufficient to assure that the Soviets would also have to operate in a protective posture. Binary weapons, which do not contain toxic substances until the components are mixed, give us the flexibility, capability, and safe handling characteristics we seek for a U.S. chemical offensive capability. We must continue developing as well as procure binary weapons, such as the Bigeye spray bomb. In Fiscal Year 1985, we have included funds for binary weapons.

SECTION VI

CONCLUSION

Our nation faces a real and serious threat today--the vast military machine which the Soviets continue to build. Over the past 20 years, the Soviets have relentlessly modernized and expanded their military capability. In addition, the Soviets continue to use this military power to undertake more political and military adventurism throughout the world, but especially in areas vital to our national security. If left unchallenged, this Soviet military build-up will disrupt deterrence by creating a shift in the balance of power.

It is imperative that we continue to pursue our objectives to protect our vital interests around the world, to deter any use of force, and to develop a firm basis for negotiating reductions in nuclear armaments.

These objectives determine our budget priorities, as well as our programs, for the next five years. For Fiscal Year 1985, we remain consistent in our budget priorities supporting our people, modernizing our strategic forces, improving the readiness and sustainability of our forces, enhancing our force projection capabilities, modernizing and expanding our theater forces, and improving our capabilities in space.

For the past three years, we have been embarked on a steady course to restore the strength and credibility of our strategic and conventional forces. In addition, we have taken great care in structuring the Air Force's RDT&E and weapon system procurement programs for Fiscal Year 1985. These programs continue to fully support, in conjunction with the other elements of our defense program, our national security objectives. The Air Force budget request represents a realistic assessment of the programs necessary to respond to the Soviet threat. The request was constructed with considerable deliberation regarding a balance among required military capability, program priorities and available resources.

Today's investments in RDT&E, procurement, and military construction provide tomorrow's force structure growth and capability. In making these investments, we are firmly resolved to manage our defense dollars wisely, to increase efficiency in our weapon system acquisition process, and control cost to maximize the return on our investment.

Congressional approval and funding of the programs in our Fiscal Year 1985 budget request will demonstrate our resolve to strengthen our national defense and protect our interests worldwide.

TABLE I
DEPARTMENT OF THE AIR FORCE
FISCAL YEAR 1985 AIRCRAFT PROCUREMENT ESTIMATES
(In Millions of Dollars)

COMBAT AIRCRAFT	QTY	FY 85 ESTIMATES
B-1B Strategic Bomber	34	7,102.6
F-15 Tactical Fighter	48	2,052.9
F-16 Tactical Fighter	150	3,748.0
Tactical Fighter Derivative Aircraft	-	26.6
KC-10A Advanced Tanker/Cargo Aircraft	8	647.0
MC-130H	2	92.7
	242	13,669.8
COMBAT SUPPORT AIRCRAFT		
C-5B Airlift Aircraft	10	2,099.4
C-20	3	55.1
T-46A Next Generation Trainer	10	126.7
HH-60D Helicopter	-	22.5
TR-1/U-2R	4	210.6
Range Control Aircraft	2	16.4
	29	2,530.7
MODIFICATION OF IN-SERVICE AIRCRAFT		3,382.1
AIRCRAFT SPARES AND REPAIR PARTS		5,990.2
AIRCRAFT SUPPORT EQUIPMENT & FACILITIES		
Other Production Charges		2,085.9
Common Aerospace Ground Equipment		703.9
War Consumables		235.4
Industrial Responsiveness		78.5
		3,103.7
TOTAL AIR FORCE AIRCRAFT PROCUREMENT	271	$28,676.5M

TABLE II
DEPARTMENT OF THE AIR FORCE
FISCAL YEAR 1985 MISSILE PROCUREMENT ESTIMATES
(In Millions of Dollars)

	QTY	FY 85 ESTIMATES
BALLISTIC MISSILES		
Peacekeeper	40	2,938.9
OTHER MISSILES		
ALCM	-	74.0
GLCM	120	571.1
AGM-65D Maverick	4500	565.2
HARPOON	85	40.3
AGM-88A HARM	871	326.3
Rapier	8	7.6
AMRAAM	174	413.0
Stinger	156	12.9
Target Drones	-	37.5
Tactical Drones	505	38.9
	6419	2,086.8
MODIFICATION OF IN-SERVICE MISSILES		162.3
SPARES AND REPAIR PARTS		639.8
OTHER SUPPORT		
Space Programs		1,299.2
Special Programs		2,662.1
Industrial Facilities		31.4
		3,992.7
TOTAL AIR FORCE MISSILE PROCUREMENT	6459	$9,820.6M

TABLE III
DEPARTMENT OF THE AIR FORCE
FISCAL YEAR 1985 OTHER PROCUREMENT ESTIMATES
(In Millions of Dollars)

	FY 1985 ESTIMATES
MUNITIONS & ASSOCIATED EQUIPMENT	1,424,6
VEHICULAR EQUIPMENT	441.6
ELECTRONICS & TELECOMMUNICATIONS EQUIPMENT	2,692.7
OTHER BASE MAINTENANCE & SUPPORT EQUIPMENT	5,002.6
TOTAL AIR FORCE OTHER PROCUREMENT	$9,561.5M

TABLE IV
DEPARTMENT OF THE AIR FORCE
FISCAL YEAR 1985 RDT&E BUDGET ESTIMATES
(IN MILLIONS OF THEN YEAR DOLLARS)

RDT&E PROGRAM SUMMARY

TITLE	FY 85
TECHNOLOGY BASE	777.7
ADVANCED TECHNOLOGY DEVELOPMENT	584.0
STRATEGIC PROGRAMS	4,445.3
TACTICAL PROGRAMS	2,612.4
INTELLIGENCE & COMMUNICATIONS	215.7
DEFENSE WIDE MISSION SUPPORT	1,999.2
CLASSIFIED PROGRAMS	3,767.8
TOTAL RESEARCH, DEVELOPMENT, TEST AND EVALUATION	$14,402M

PROGRAM DETAILS

TECHNOLOGY BASE

PE #	TITLE	FY 85
61101F	In-House Laboratory Independent Research	16.8
61102F	Defense Research Sciences	190.1
62101F	Geophysics	37.1
62102F	Materials	52.4
62201F	Aerospace Flight Dynamics	64.2
62202F	Aerospace Biotechnology	47.4
62203F	Aerospace Propulsion	60.4
62204F	Aerospace Avionics/VHSIC	72.5
62205F	Training/Simulation Technology	23.2
62302F	Rocket Propulsion	40.0
62601F	Advanced Weapons	44.8
62602F	Conventional Munitions	42.8
62702F	Command, Control, Communications	76.9
62703F	Personnel Utilization Technology	8.8

ADVANCED TECHNOLOGY DEVELOPMENT

PE #	TITLE	FY 85
63106F	Logistics R&D Requirements	5.3
63202F	Aircraft Propulsion Subsystem Integration	27.0
63203F	Advanced Avionics for Aircraft	21.8
63205F	Flight Vehicle Technology	20.9
63208F	Recon Sensors/Processing Technology	8.3
63211F	Aerospace Structures and Materials	10.9
63215F	Aviation Turbine Fuel Technology	4.3
63216F	Adv Turbine Engine Gas Generator	25.4
63217F	Special Power Systems	1.0
63226F	DOD Common Prog Language (ADA)	8.1
63227F	Advanced Simulator Technology	7.5

PE #	TITLE	FY 85
63231F	Crew System Technology	10.7
63244F	Aircraft Non-nuclear Survivability	3.9
63245F	Advanced Fighter Technology Integration	19.0
63250F	Lincoln Laboratory	23.7
63253F	Advanced Systems Integration Demonstration	33.2
63259F	Cartog Applications-Tac & Strat System	1.1
63302F	Space and Rocket Propulsion	5.5
63313F	Advanced Missile Subsystems Demonstration	1.2
63319F	Advanced Technology Cruise Missile	15.4
63363F	Hypervelocity Missile	3.0
63365F	Space Biotechnology	.7
63401F	Advanced Spacecraft Technology	30.7
63406F	Advanced Military Spaceflight Capability	2.8
63410F	Space Sys Environ Interactions Technology	3.7
63424F	Missile Surveillance Technology	7.0
63452F	Very High Speed Integrated Circuits	120.0
63601F	Conventional Weapons Technology	21.8
63605F	Advanced Radiation Technology	12.4
63704F	Manpower and Personnel Sys Technology	2.0
63707F	Weather Systems	3.0
63718F	Electronic Warfare Technology	22.1
63723F	Civil/Environmental Engine Technology	17.2
63726F	Fiber Optics Development	3.1
63727F	Advanced Communications Technology	4.8
63728F	Advanced Computer Technology	6.7
63743F	Electro-Optical Warfare	17.8
63745F	Chemical Warfare Defense	3.8
63750F	Counter/Countermeasures-Advanced Develop	10.4
63751F	Innovations in Education and Training	3.1
63752F	DOD Software Engineering Institute	8.0
63789F	C^3 Advanced Development	23.6

STRATEGIC PROGRAMS

11113F	B-52 Squadrons	22.2
11142F	KC-135 Squadrons	4.0
11213F	Minuteman Squadrons	4.7
11312F	PACCS and WWABNCP System EC-135	.8
11316F	SAC Communications	1.5
12310F	NCMC-TW/AA Systems	23.8
12311F	NCMC-Space Defense Systems	52.3
12313F	Ballistic Msl Tac Warning/Atk Assess Sys	3.2
12325F	Joint Surveillance System	1.8
12411F	Surveill Radar Stations/Sites	11.9
12412F	DEW Radar Stations	63.1
12417F	CONUS Over-the-Horizon Radar	60.9
12423F	Ballistic Missile Early Warning System	10.0
12424F	Spacetrack	10.2
12431F	Defense Support Program	64.0
12432F	SLBM Radar Warning Systems	12.2

PE #	TITLE	FY 85
12433F	Integ Operational Nudets Detect System	34.8
12436F	C² Process/Display System	11.7
32015F	NEACP and E-4B Class V Mods	27.1
33131F	Minimum Essential Emergency Comm Network	116.9
33154F	WWMCCS Information System-JPMO	32.6
33601F	AF Satellite Communication System	141.6
33603F	MILSTAR	325.0
35155F	Theater Nuc Wpn Storage & Security System	2.0
63258F	Common Strategic Rotary Launcher	77.3
63311F	Advanced Strategic Missile Systems	108.3
63364F	Advanced Air-to-Surface Missile	54.4
63716F	Atmospheric Surveillance Technology	4.9
63735F	WWMCCS Architecture	11.0
64226F	B-1B	508.3
64312F	ICBM Modernization	2440.8
64326F	Strat Conventional Standoff Capability	21.6
64361F	Air Launched Cruise Missile	28.0
64406F	Space Defense System	143.3
64711F	Systems Survivability (Nuclear Effects)	9.1

TACTICAL PROGRAMS

PE #	TITLE	FY 85
27129F	F-111 Squadrons	71.9
27130F	F-15 Squadrons	82.9
27131F	A-10 Squadrons	4.1
27132F	Dual Role Fighter	147.0
27133F	F-16 Squadrons	83.4
27136F	F-4G Wild Weasel Squadrons	55.3
27162F	Tactical AGM Missiles	3.7
27247F	Air Force TENCAP	.3
27411F	Overseas Air Weapon Control System	3.2
27412F	Tactical Air Control System	28.4
27417F	Tac Airborne Warning and Control System	76.6
27423F	Advanced Communications System	87.0
27431F	Tac Air Intelligence System Activities	1.6
27435F	Tac Reconnaissance Imagery Exploitation	1.2
27595F	Base Comm-Tac Air Forces	1.0
28010F	Jt Tactical Comm Program (TRI-TAC)	11.5
33605F	Satellite Communications Terminals	2.9
35887F	Electromagnetic Combat Intelligence Support	1.9
41115F	C-130 Airlift Squadrons	.8
41840F	MAC Command/Control System	4.4
63230F	Advanced Tactical Fighter (ATF)	94.3
63239F	Adv Tactical Air Reconnaissance Sys	3.7
63256F	Jt Service Adv Vert Lift Acft (JVX)	1.1
63307F	Airbase Survivability and Recovery	4.4
63609F	Advanced Attack Weapons	20.0
63714F	DOD Physical Security Eq-Exterior	1.9

PE #	TITLE	FY 85
63742F	Combat Identification Technology	19.3
63749F	C3CM Advanced Systems	1.0
63770F	Jt Survability Target Attack Radar System	3.3
64201F	Acft Avionics Equipment Development	25.8
64209F	F-100 Durability	14.0
64212F	Acft Equip Development	12.0
64218F	Engine Model Derivative Program	9.2
64220F	EW Counter Response	23.9
64222F	Nuclear Weapons Support	1.9
64223F	Alternate Fighter Engine	56.9
64231F	C-17 Program	129.3
64247F	Modular Automatic Test Equipment	15.8
64249F	Night Precision Attack	98.3
64268F	Acft Engine Component Improvement Program	149.8
64302F	Defense Suppression Weapons Eng Dev	14.8
64313F	Next Generation Trainer	78.0
64314F	Adv Med Range Air-to-Air Missile	217.7
64321F	Joint Tactical Fusion Program	17.8
64324F	Joint Tactical Missile System	35.5
64362F	Ground Launched Cruise Missile	18.7
64601F	Chemical/Biological Defense Equipment	18.2
64602F	Armament Ordnance Development	20.8
64604F	Submunitions Development	48.7
64607F	Wide-Area Anti-Armor Munition	27.3
64617F	Air Base Survivability and Recovery	18.1
64703F	Aeromedical Systems Development	7.0
64706F	Life Support System	15.6
64708F	Other Operational Equipment	22.8
64710F	Reconnaissance Equipment	9.6
64715F	DOD Physical Security Eq-Exterior	12.6
64724F	Tac C3 Countermeasures	28.1
64725F	Combat Identification Systems	16.0
64733F	Surface Defense Suppression	24.5
64737F	Airborne Self-Protection Jammer	29.1
64738F	Protective Systems	48.6
64739F	Tactical Protective System	86.6
64740F	Computer Resources Management Technology	12.4
64742F	Precision Location Strike System	83.0
64750F	Intelligence Equipment	15.3
64753F	Combat Helicopter Modernization	81.3
64754F	Jt Tactical Information Distribution System	86.7
64756F	Side Looking Airborne Radar (SLAR)	24.5
64770F	Joint STARS	95.0
64779F	Jt Interoperability Tactical C^2 System	13.5
	INTELLIGENCE AND COMMUNICATIONS	
33110F	Defense Satellite Communication System	31.6
33126F	Long Haul Communications (DCS)	9.3
33144F	Electromagnetic Compatibility Anal Center	7.8

PE #	TITLE	FY 85
35114F	Traffic Cntrl/Approach/Landing System	11.8
35164F	NAVSTAR GPS (User Eq)	9.1
35165F	NAVSTAR GPS (Space/Grnd Segment)	33.5
63431F	Space Communications	44.4
64778F	NAVSTAR GPS Full Scale Development	61.0
84733F	General Intelligence Skill Training	7.2
	DEFENSE WIDE MISSION SUPPORT	
33151F	WWMCCS - ADP	.7
35110F	Satellite Control Facility	99.2
35119F	Space Boosters	20.4
35130F	Consolidated Space Operations Center	72.7
35160F	Def Meteorological Satellite Program	42.6
35171F	Space Launch Support	93.8
63248F	Concept Development	2.5
63402F	Space Test Program	71.5
63438F	Satellite Systems Survivability	5.5
64211F	Adv Aerial Target Development	3.4
64227F	Flight Simulator Development	149.9
64411F	Space Shuttle	345.8
64609F	Logistics Technology for Weapons Sys	7.6
64707F	Weather Systems	8.3
64735F	Range Improvement	16.8
64747F	Electromagnetic Radiation Test Facility	7.8
64755F	Improved Capability for RDT&E	75.1
65101F	Project Air Force	16.8
65304F	Acquisition/Command Support - TELECOM	7.1
65306F	Ranch Hand II Epidemiology Study	3.3
65708F	Nav/Radar/Sled Track Test Support	18.7
65806F	Acquisition and Command Support	354.1
65807F	Test and Evaluation Support	437.5
65808F	Advanced Systems Engineering/Plan	3.6
65863F	RDT&E Aircraft Support	47.5
65872F	Productivity Improvement	6.1
71112F	Inventory Control Point Operations	1.4
78011F	Industrial Preparedness	61.9
78026F	Product/Reliable/Avail/Maintain Program	14.9
A1004F	International Activities	2.8

Senator WARNER. Thank you, Mr. Secretary. General Russ, you may proceed.

STATEMENT OF LT. GEN. ROBERT D. RUSS, USAF, DEPUTY CHIEF OF STAFF FOR RESEARCH, DEVELOPMENT AND ACQUISITION

General RUSS. Mr. Chairman, it is an honor to be back in front of this committee again. I also have a brief statement that I would like to enter into the record, with your permission.

As you know, Congress had levied some reporting requirements on the Department of Defense, and in essence what my statement does is to address how we have complied with the congressional reporting requirement and will supplement the statement of Dr. Cooper.

[The prepared statement of General Russ follows:]

PREPARED STATEMENT BY LT. GEN. ROBERT D. RUSS, DEPUTY CHIEF OF STAFF FOR RESEARCH, DEVELOPMENT AND ACQUISITION, U.S. AIR FORCE

Mr. Chairman and members of the committee: Good afternoon. It is my pleasure to be here today to report on the Air Force ICBM modernization program. Tremendous progress was made during 1983 in achieving a bipartisan consensus on a comprehensive approach for ICBM modernization. Following the recommendations of the Scowcroft Commission, the President proposed and Congress approved an approach that has three main features: (1) deployment of 100 Peacekeeper missiles in existing Minuteman silos in eastern Wyoming and western Nebraska; (2) development of a small single warhead mobile ICBM; and (3) follow-on technology programs aimed at enhancing ICBM survivability in the longer term. At the same time and consistent with these efforts, the President has made innovative arms reduction proposals designed to promote strategic stability while maintaining deterrence, the cornerstone of our nuclear policy.

In supporting the President's programs, Congress has directed that it be provided information with which to monitor the modernization and arms control efforts and to make informed decisions in the future. Attached is a summary of Congressional reporting requirements and action taken to date to comply with those requirements.

REPORT OF COMPLIANCE WITH CONGRESSIONAL INFORMATION REQUESTS

REQUIREMENT (1)

Section 110 of the fiscal year 1984 DOD Authorization Act requires the Secretary of the Air Force to publish a final environmental impact statement (EIS) on the deployment and peacetime operation of MX missiles in Minuteman silos not later than January 31, 1984.

ACTION (1)

The final EIS was published and copies provided to Congress on 30 January 1984.

REQUIREMENT (2)

Section 1231(c)(1) of the fiscal year 1984 DOD Authorization Act requires, not later than January 15 of each year from 1984 through 1988, the Secretary of Defense to submit to the Senate and House Armed Services Committees a report on:

> The progress being made with respect to the development and deployment of the MX missile system;
>
> The progress being made with respect to the development and testing of a small mobile ICBM system; and
>
> Developments related to silo-hardening technology.

Section 1231(c)(2) requires each report to contain a certification by SECDEF on whether DOD is developing a small mobile ICBM system with a small missile weighing no more than 33,000 pounds and carrying no more than a single warhead.

Section 1231(d) requires a report by SECDEF to Congress at anytime it appears, during development efforts, that the weight of the missile will exceed 30,000 pounds. The report will state the projected weight of the missile, provide an explanation of the reasons for the weight exceeding 30,000 pounds, and the anticipated effects that weight could have on the mobility and blast resistance of the missile system.

Section 1231(e) requires to the President to submit to the Senate and House Armed Services Committees, coincident with the submission of any request for funds for the procurement of operational MX missiles intended for deployment, a written assessment relating to the requirement for and the anticipated impact of the procurement of such missiles. The assessment is to include the President's judgment with respect to:

The degree to which current and projected international conditions require the procurement of such missiles for operational purposes.

The expected impact the procurement of such missiles will have on the stability of the strategic balance between the U.S. and the USSR.

The effect the procurement of such missiles, if approved by Congress, will likely have on achieving negotiated reductions in the nuclear forces of the U.S. and USSR through sound, equitable, and verifiable arms control agreements.

ACTION (2)

The requirements of sections 1231(c)(1), 1231(c)(2), were met by the SECDEF's submission of the first annual ICBM Modernization Program Progress Report, dated 13 January 1984.

The requirement of section 1231(d) is inapplicable at this time since the weight of the small ICBM is not expected to exceed 30,000 pounds.

The requirements of section 1231(e) were fulfilled by submission of the President's Report to Congress on Procurement of Additional Peacekeeper/MX Missiles, dated 1 February 1984.

REQUIREMENT (3)

Section 1232 fiscal year 1984 DOD Authorization Act, requires the Department of Defense, in its submission to Congress to authorize fiscal year 1985 appropriations for the small mobile single single warhead ICBM, to set forth funding and production schedules consistent with the earliest possible initial operational capability (IOC), at or prior to 1992.

ACTION (3)

The requirement of Section 1232 was met with the submission of the FY 1985 U.S. ICBM Modernization RDT&E Descriptive Summary accompanying the President's fiscal year 1985 budget submission.

REQUIREMENT (4)

The Senate Armed Services Committee Report (Report No. 98-174) accompanying the fiscal year 1984 DOD Authorization Bill recommends making a clear distinction between MX missiles being procured for operational deployment and those acquired for other purposes (page 116).

ACTION (4)

The distinction referred to above is made in the fiscal year 1985 U.S. ICBM Modernization RDT&E Descriptive Summary accompanying the President's budget submission.

REQUIREMENT (5)

The House Armed Services Committee Report (Report No. 98-107), accompanying the fiscal year 84 DOD Authorization Bill directs that funds authorized for RDT&E and procurement of the MX missile system not be obligated or expended until the Secretary of Defense has provided Congress with a precise schedule for the development and deployment of the small mobile missile system (pages 5, 145, and 147).

ACTION (5)

SECDEF submitted small mobile missile system schedule to Congress on 9 December 1983.

REQUIREMENT (6)

The Conference Report (Report No. 98-567) accompanying the fiscal year 1984 DOD Appropriations Bill requires (page 69).

The ICBM modernization program be divided into the following categories:

The Peacekeeper missile system;

The small missile system, including hardened mobile launcher, and

ICBM follow-on technology programs with generic applicability to either Peacekeeper or the small missile such as the hardened silo and deep basing programs.

A complete breakdown of costs for silo hardening to be submitted with the fiscal year 1985 budget.

ACTION (6)

The ICBM modernization program was divided into the directed categories in the fiscal year 1985 budget submission.

The breakdown of costs for silo hardening was presented in the fiscal year 1985 U.S. ICBM Modernization RDT&E Descriptive Summary accompanying the budget submission.

REQUIREMENT (7)

The Senate Appropriations Committee Report (Report No. 98-292) accompanying the fiscal year 1984 DOD Appropriations Bill requires a complete breakdown on development and acquisition cost estimates for the small, missile, hardened mobile launcher, hardened silo and deep basing programs, to accompany the fiscal year 1985 budget submission (page 180).

ACTION (7)

The directed cost breakdowns are in the fiscal year 1985 U.S. ICBM Modernization Program RDT&E Descriptive Summaries accompanying the fiscal year 1985 budget submission.

REQUIREMENT (8)

The House Armed Services Committee Report (Report No. 98-166) accompanying the Military Construction Authorization Bill directs that before undertaking construction, DOD is expected to comply with Report No. 98-107 requiring submission of a small mobile missile schedule (page 6).

ACTION (8)

SECDEF submitted the small mobile missile schedule to Congress on 9 December 1983.

REQUIREMENT (9)

The Senate Appropriations Committee Report (Report No. 98-180) accompanying the fiscal year 1984 Military Construction Appropriation Bill requires (pages 17 and 38):

A detailed submission on all military construction requirements for the MX system in the latest basing mode.

A report outlining the plans for future use of the J-4 test cell at the Arnold Engineering Development Center and the altitude test program outlined for Stage II of the MX.

ACTION (9)

A report on the construction requirements was forwarded by the Air Force on 10 August 1983.

The J-4 test cell report was forwarded by the Air Force on 11 January 1984.

REQUIREMENT (10)

The House Appropriations Committee Report (Report No. 98-238) accompanying the Military Construction Appropriations Bill requires (Page 16 and 17):

Submission of a detailed site and construction plan for the overall MX basing mode.

Submission of an appraisal of the feasibility of hardening the 100 Minuteman silos and how much such an approach would effect the current MX basing proposal for Wyoming and Nebraska.

A review of the determination that only above ground construction for MX basing is to be funded in the military construction account.

Submission of a master plan that outlines the cost estimates for on-site and off-site construction addressing—

Options on how the current building program could be altered if superhardening were required for MX silos;

How existing Minuteman facilities for training, maintenance, and operations can be used;

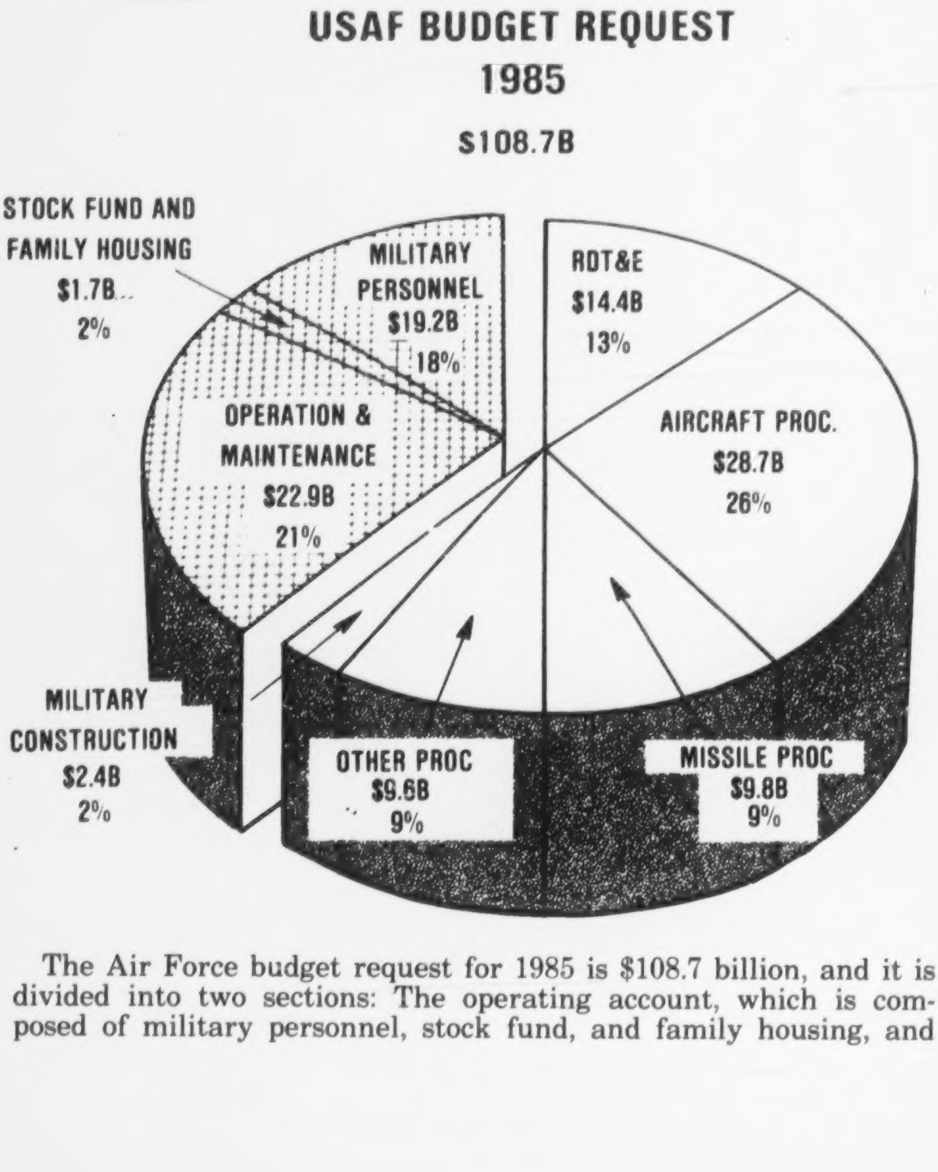
An analysis of cost comparisons between silo assembly and an on-base central assembly building, and

Requirements for additional land acquisition.

ACTION (10)

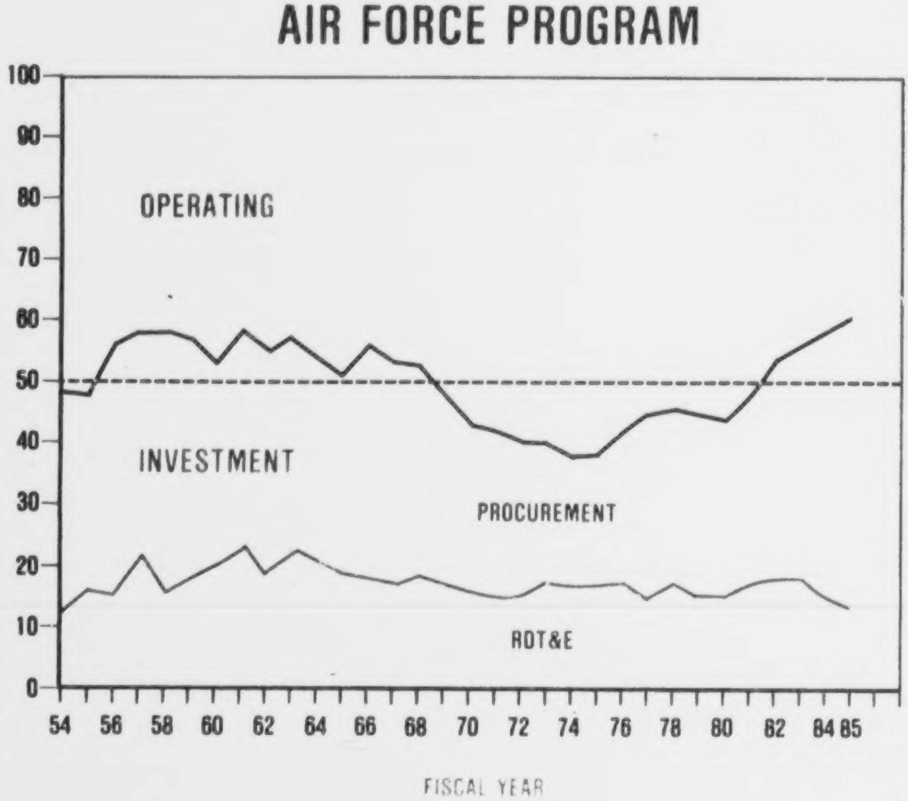
All requirements were met in a Report on the Peacekeeper Military Construction Program forwarded by the Air Force on 10 August 1983.

General Russ. What I would like to do, sir, is to open up with several slides to show you where we are and how the strategic funding fits within the entire Department of Defense budget or the Air Force's budget and show you where we are going.



The Air Force budget request for 1985 is $108.7 billion, and it is divided into two sections: The operating account, which is composed of military personnel, stock fund, and family housing, and the operation and maintenance account, and accounts for approximately 40 percent of the budget.

The investment side of the budget accounts for 60 percent of the budget and includes the research and development tests, aircraft procurement, missile procurement, other procurement, and military construction. This [indicating] is the section that we will be discussing today.



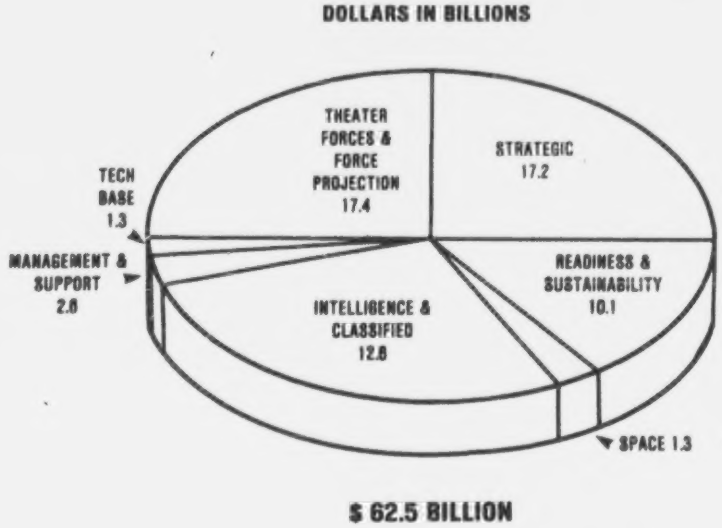
AIR FORCE PROGRAM

Now, if we look back over time, you will see the balance between the operating account and the investment accounts has wavered around the 50-percent line. Back in the latter part of the fifties and the sixties, actually, we spent a little bit more than 50 percent on the investment account. During the seventies, the operations account took more of the budget, and now in the 1980's the trend has reversed again and investment is a larger part of the budget.

Now, in the investment account, of course, we have procurement and research and development. R&D has fairly well stabilized at about 15 to 16 percent of the budget. I might say that this year it is down to 13 percent, and the procurement account is up somewhat.

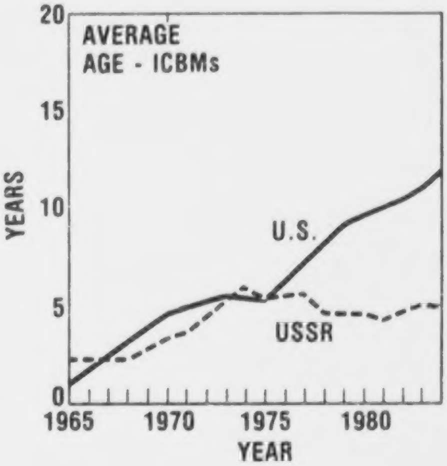
I think that is a good trend. It shows that the R&D we have invested in previous years now is paying off, and we are now putting things out into the field that will enhance the capability of our forces.

FY 1985 AIR FORCE INVESTMENT BUDGET MAJOR MISSION AREAS



If you look at that pie in another way, you will see that a little over 25 percent—actually, it is about 27 percent—of the budget does go for strategic programs. That is $17.2 billion out of $62.5 billion in the investment account. ICBM modernization takes about $6 billion out of that $17.2 billion.

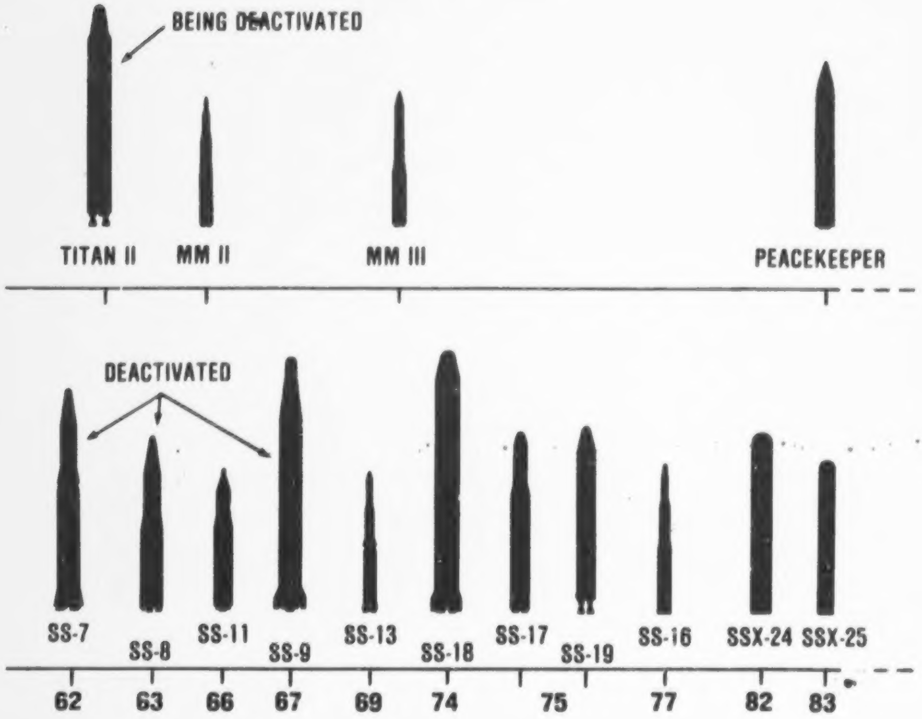
ICBM FORCE AGING COMPARISON



The reason we put so much money into that is because—well, it can be represented starting with this slide. This shows the average age of our ICBM's. In essence, what it says is that the average age of the Soviets' ICBM's are around the 5-year mark, while the United States is twice that much, over the 10-year mark.

And that is easily understood when you look at this chart.

U.S. AND SOVIET ICBM DEVELOPMENT HISTORY



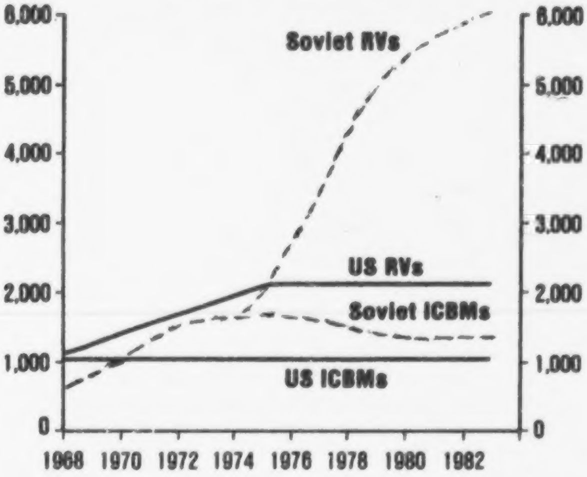
You see that the last ICBM that entered into our force was the Mintueman III, and subsequent to that time the Soviets have entered all of these types down here [indicating], in addition, to adding a significant number of MIRV'd warheads. As a matter of fact, about 660 new missiles have been entered into their inventory and over 6,000 warheads.

Senator WARNER. Now, from Minuteman III to date what percentage of warheads have they added?

General RUSS. I can show that on the next slide, sir.

US/SOVIET LAUNCHER & REENTRY VEHICLE COMPARISON

US and Soviet ICBM Launcher and Reentry Vehicle (RV) Deployment 1968-1983



Here is a good representation of that. You can see where the Minuteman III goes back in here [indicating]. You can see what has happened to the reentry vehicles. It shows that we have stabilized here at the Minuteman point [indicating], and we are a little over 2,000 reentry vehicles. They are at about three times that many. So that shows the dramatic change in the 1970's, when the number of reentry vehicles were added to the force.

When we look at these sort of things, we ask ourselves, what are we going to do about it?

Dr. Cooper. I might add, General Russ, before we leave that, not only have the numbers increased, Mr. Chairman, but also the sophistication and the capability of those warheads in terms of accuracy.

Senator Warner. Now, in terms of the missile itself, those curves look flat.

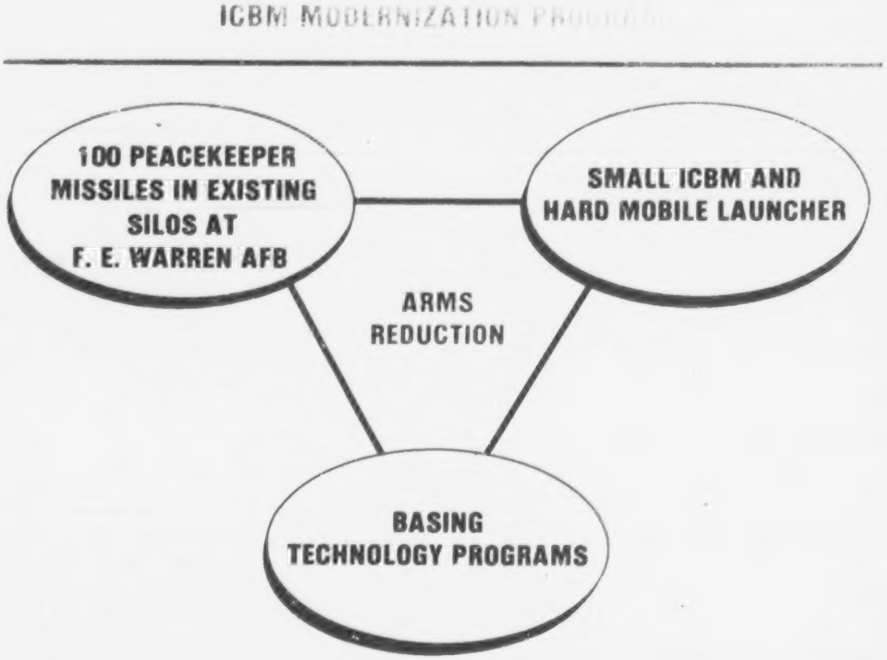
General Russ. This represents the U.S. missiles, our total missiles in 1968.

Dr. Cooper. What that represents, Mr. Chairman, is the fact that in that early timeframe the Soviets came upon MIRV technology, the ability to put on more than one warhead per launcher. And so, as you see, although their launchers have not gone up significantly, in fact they have dropped, they have now fractionated. And the SS-18 is limited to 10 warheads, as you know, but they have a capability to carry many per launcher, as opposed to 1 per launcher in the late sixties.

Senator Warner. The MIRVing is the "Y" in the road there?

Dr. Cooper. Yes, sir.

General Russ. Here is where we started MIRVing and you can see what happened to us when we MIRV'd [indicating]. The Soviets started a major MIRV effort right about here, and as you can see, the line goes almost straight up [indicating].


ICBM MODERNIZATION PROGRAM
100 PEACEKEEPER MISSILES IN EXISTING SILOS AT F. E. WARREN AFB
SMALL ICBM AND HARD MOBILE LAUNCHER
ARMS REDUCTION
BASING TECHNOLOGY PROGRAMS

We have set upon a three-part program to redress those imbalances. It is composed of the 100 Peacekeeper missiles, the small ICBM mobile missile, and technology programs to support both of these.

I would now like to have General Fornell discuss with you where we are in these programs, and where we plan on going in the next few years.

STATEMENT OF BRIG. GEN. GORDON E. FORNELL, USAF, SPECIAL ASSISTANT FOR ICBM MODERNIZATION

U.S. ICBM MODERNIZATION PROGRAM

General Fornell. Mr. Chairman, members of the committee, I am pleased to be able to present this progress report, which I think significantly shows you that we have stepped out in a very energetic and enthusiastic way in implementing the recommendations of the Scowcroft Commission.

Last year at this time we were right in the middle of the debate, working very hard with the Department of Defense, the administration and the Congress in taking the Scowcroft Commission recommendations and putting them into a Presidential format directing the Department of Defense to carry out the Scowcroft recommendations.

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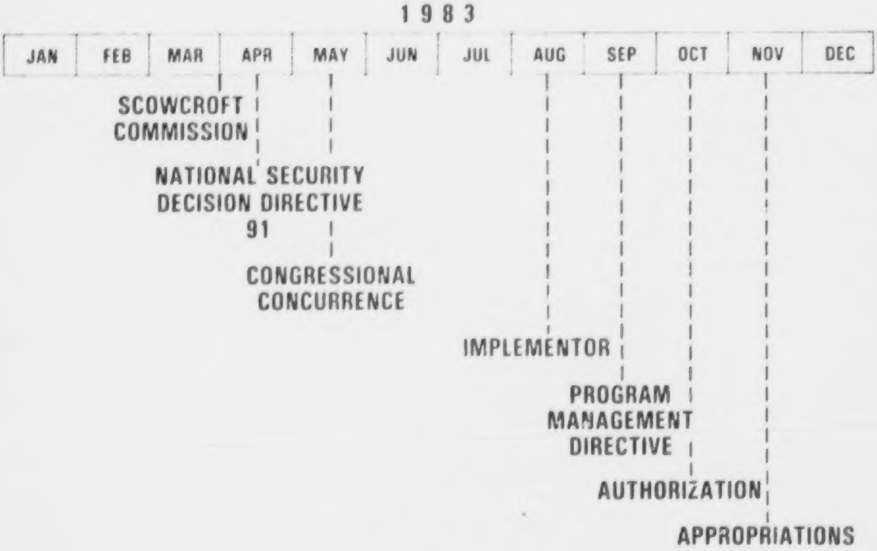
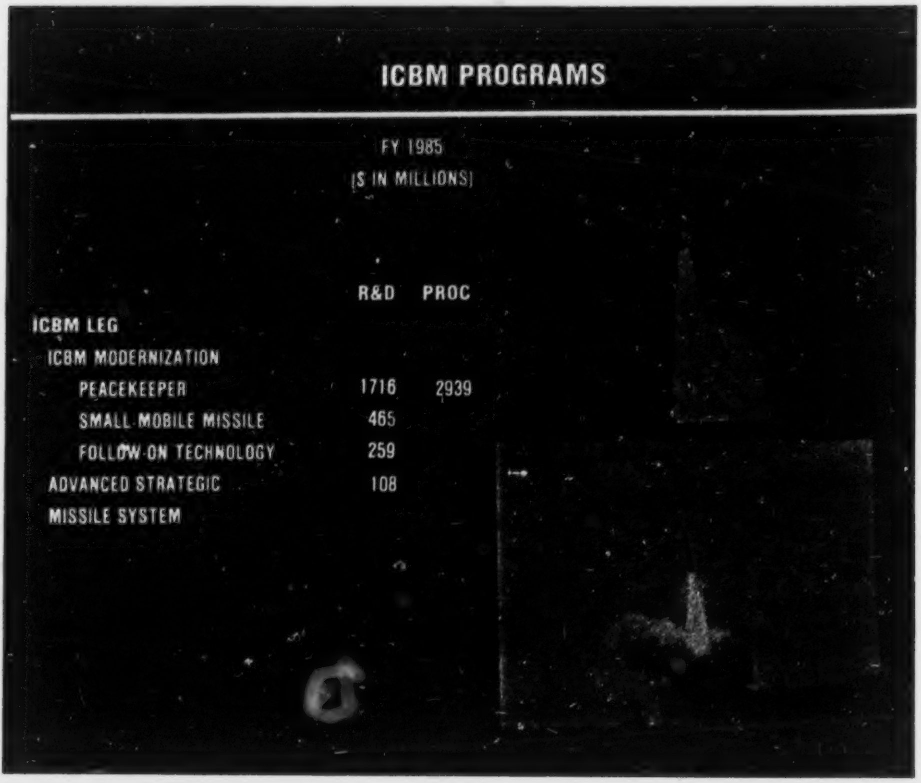
U.S. ICBM PROGRAM
GUIDANCE AND DIRECTION



UNCLASSIFIED

Additionally, of course, the Congress voted specifically on those recommendations and implementation plans, which were turned into direction to the field. We then came through the 1984 authorization and appropriations process, most significantly with the approval for production of the first 21 Peacekeeper missiles and beginning the engineering design of the small mobile missile. We are continuing our basing technology efforts that have been underway in previous programs.



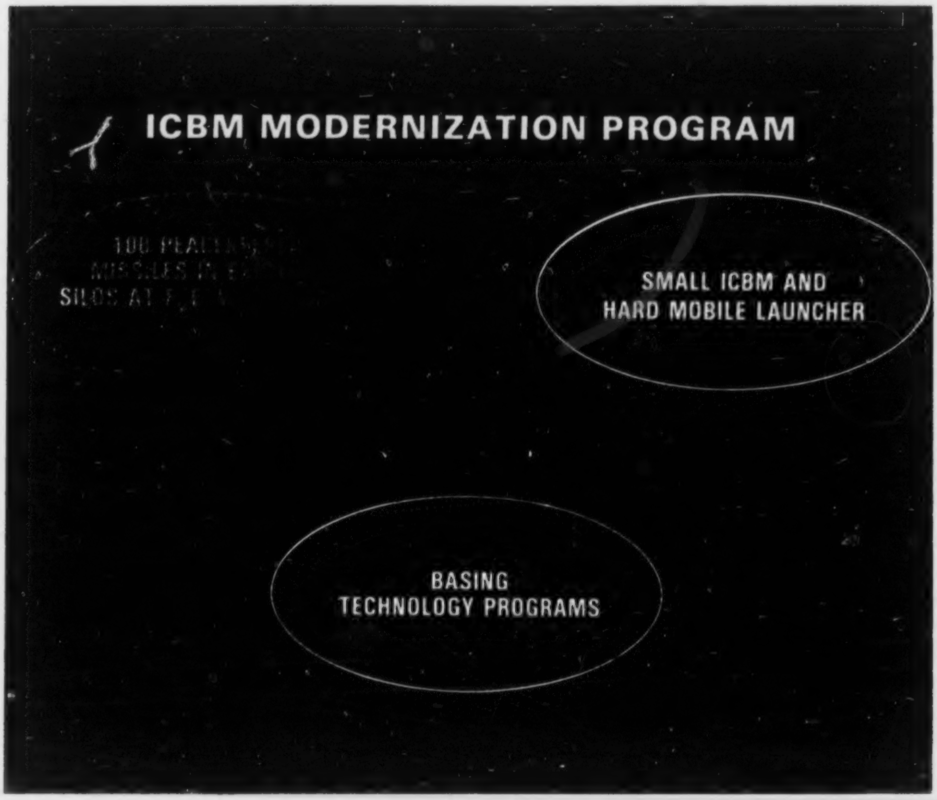
ICBM PROGRAMS

FY 1985
($ IN MILLIONS)

	R&D	PROC
ICBM LEG		
ICBM MODERNIZATION		
PEACEKEEPER	1716	2939
SMALL MOBILE MISSILE	465	
FOLLOW-ON TECHNOLOGY	259	
ADVANCED STRATEGIC MISSILE SYSTEM	108	

We have a 1985 budget request, as broken down here for the modernization program: for the research and development account, $1,716 billion for the Peacekeeper; the small mobile missile has $465 million; follow-on technology is at $259 million; our advanced development line, for advanced strategic missile systems is at $108 million.

Additionally, we are requesting 40 Peacekeeper missiles to complement our first 21, for almost $3 billion in missile procurement dollars.



ICBM MODERNIZATION PROGRAM

100 PEAC[illegible]
MISSILES IN E[illegible]
SILOS AT F.E. [illegible]

SMALL ICBM AND
HARD MOBILE LAUNCHER

BASING
TECHNOLOGY PROGRAMS

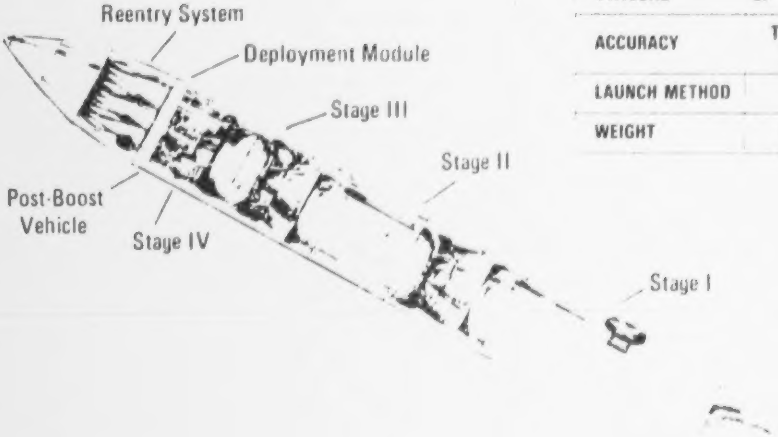
We have packaged the program in the Air Force in the following three bullets: Primarily focusing on the immediate deployment of 100 Peacekeeper missiles in existing Minuteman III silos located near Francis E. Warren Air Force Base in Cheyenne, WY.

Second, was to begin the engineering design of the small mobile missile and the hard mobile launcher to go with it in a proposed basing mode.

Additionally, of course, our basing technology, which focuses primarily on silo hardness tests and deep basing concepts.

Of course, the whole package is complementary and in agreement with the President's proposal in arms reduction.

PEACEKEEPER MISSILE



CHARACTERISTICS	PEACEKEEPER
PAYLOAD	UP TO 10 MK-21s
ACCURACY	TWICE MM III ACCURACY
LAUNCH METHOD	COLD
WEIGHT	195,000 LB

To review briefly, the Peacekeeper missile is about 70 feet long, it is 92 inches in diameter, and it weighs 195,000 pounds. It is propelled by three solid rocket motors. It has a liquid propellant fourth stage which precisely positions the bus that deploys the reentry vehicles. And then, of course, it is capable of carrying up to 10 advanced ballistic reentry vehicles or Mark 21 reentry vehicles.

We are attaining tremendous accuracy on our first three flight tests, and we can get into that in a little greater detail later on. It uses a cold launch method. That means it is similar to a submarine launch, where the missile rides up on gas from a generator system inside the canister. As it exits the canister, and clears the lip, stage one ignites and the missile is on its way.

I have put together a short film to show the progress that we have attained in the program, depicting each of these major areas of the program.

[A short film was shown.]

This is stage one, built by the Morton Thiokol Co., in Utah, shown during one of its many static test firings in the Utah mountains. It is a very large rocket motor. It burns at the lower altitudes, has a great deal of thrust, and the nozzle is fully gimballed, six degrees of motion, to steer it on its way at the low end of the flight regime.

Stage two is built by the Aerojet Corp., in California. Here also shown during its static testing. It burns at a higher altitude than stage one and uses what we call an extendable nozzle exit cone, which improves the performance of the motor by hydraulically extending the nozzle to capture the plume and increase the performance.

This is during an altitude firing at our Arnold Engineering Development Center in Tennessee.

We will move now to the stage three, which is built by the Hercules Corp., also a Utah corporation. You see immediately that we are getting down to the very high-altitude regime, where we have a much smaller engine, but with a great deal of final velocity imparted to the missile.

It incorporates a more sophisticated nozzle or exit cone, in that it is a three-stage hydraulic device similar to a Boy Scout fold-out dixie cup. It extends to that position, and that is the one that Dr. Cooper mentioned we had a slight problem with on our third flight.

This is the liquid-propelled fourth stage vehicle, built by Rocketdyne, and here shown as a simulated stage three separates. This is the center engine of stage four. It has smaller velocity and vernier rocket motors that exactly position the reentry vehicle for deployment at exactly the right location. The small vernier thrusting motors that we have, are similar to those on a spacecraft for exact positioning.

Of course, the real key to the success of the flight test program has been the extreme accuracy. This is part of the guidance and control unit which is built by the Northrop Corp. We call it the advanced inertial reference sphere, which is a very, accurate guidance set, capable of performing extremely well.

The business end of the missile that carries the reentry vehicle is handled by the Avco Corp., carrying up to 10 reentry vehicles. This is the tractor motor that takes the shroud off the end of the missile, exposing the reentry vehicles for exact positioning in space leading to its target.

This is one of the rare views of the missile without it being inside its canister, at the Martin Marietta Corp. in Denver, where development checkout of electrical controls was handled. Here we put a dummy missile into the canister. The Westinghouse Corp. did tests here to demonstrate missile ejection.

These are the shock isolation pads, a super-foam material that protects the missile while it is in the canister. This is the steam generation that propels it. At the apex there, stage one would normally ignite and the missile would be on its way.

Here is a panoramic view of some of the facilities we have constructed at Vandenberg Air Force Base, where our flight test activities are conducted. These are the stage processing facilities for each stage. Each is then transported to the missile assembly building, which is the largest of our facilities.

This is the actual test support pad where our missiles are launched. The first eight missiles will be launched from this test pad. We have a new integrated test facility building to handle command and control.

This is a stage one arriving at the missile assembly building. It is lifted to overhead and placed into the canister. That whole canister with the missile then is rotated down to the horizontal position, loaded onto a many-wheeled trailer, a special vehicle, and driven out to the test support launch pad.

The canister than is bolted to the end of the launch support stand and the missile is tilted up to about the 87-degree point, where it is launched from that position.

Here, inside the integrated test facility, the controllers monitor all of the vital systems of the mission. They monitor and count down the missile during its final stages in a total automatic and electronic way.

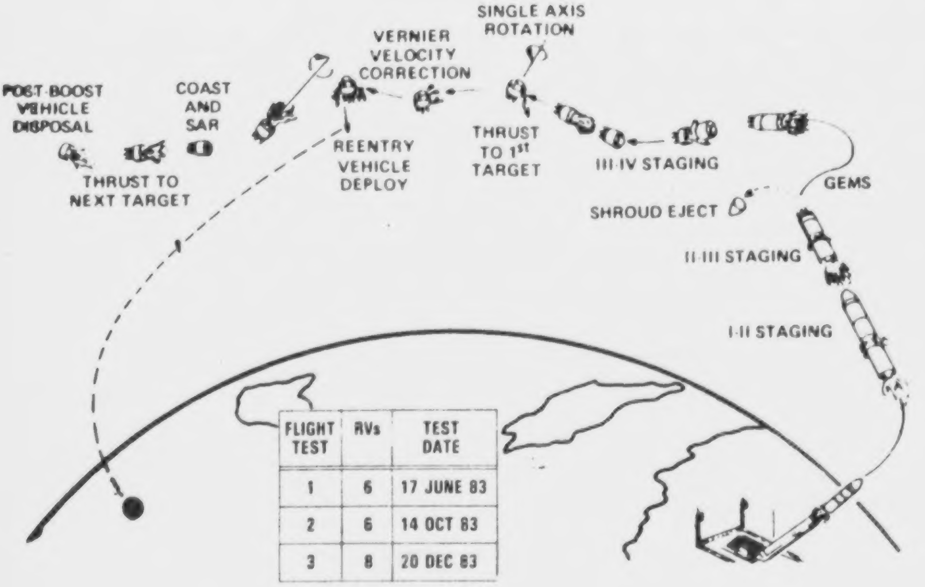
The missile is upright and ready for launch. The test controller is in the final countdown. Three, two, one, the gas generator goes, the missile pops to the canister top, stage one ignites, and the missile is on its way.

I have slowed all of that process down to give you a view of what an actual launch looks like and as stage one ignites. Here the gas generator is pushing the missile up. We have special instrumentation and cameras that are transmitting at all times throughout the duration of the mission.

Here you see the pads falling off the missile—the gas exits the canister and stage one ignited the missile on its way. Here is a very unique photograph of the actual reentry vehicles of our third flight, and you can count all eight.

I will describe in a little detail what is involved. That indeed is the reentry vehicle end of the mission.

PEACEKEEPER FLIGHT-TEST MISSION OVERVIEW


POST-BOOST VEHICLE DISPOSAL
COAST AND SAR
THRUST TO NEXT TARGET
REENTRY VEHICLE DEPLOY
VERNIER VELOCITY CORRECTION
SINGLE AXIS ROTATION
THRUST TO 1st TARGET
III-IV STAGING
GEMS
SHROUD EJECT
II-III STAGING
I-II STAGING

FLIGHT TEST	RVs	TEST DATE
1	6	17 JUNE 83
2	6	14 OCT 83
3	8	20 DEC 83

The movie ended with the reentry vehicles coming down in the target area, which is our Kwajalein missile range north. This graph merely depicts a 5,000 mile mission down to the Kwajalein north target from Vandenberg Air Force Base.

The missile does its normal staging, positions itself very accurately for the dispensing of the reentry vehicles.

Important to us is, the first three flight tests were successful. We have six reentry vehicles on each of our first two flights. We went to eight reentry vehicles on our flight just before Christmas, and on our next test flight we will be going to the full complement of 10 reentry vehicles.

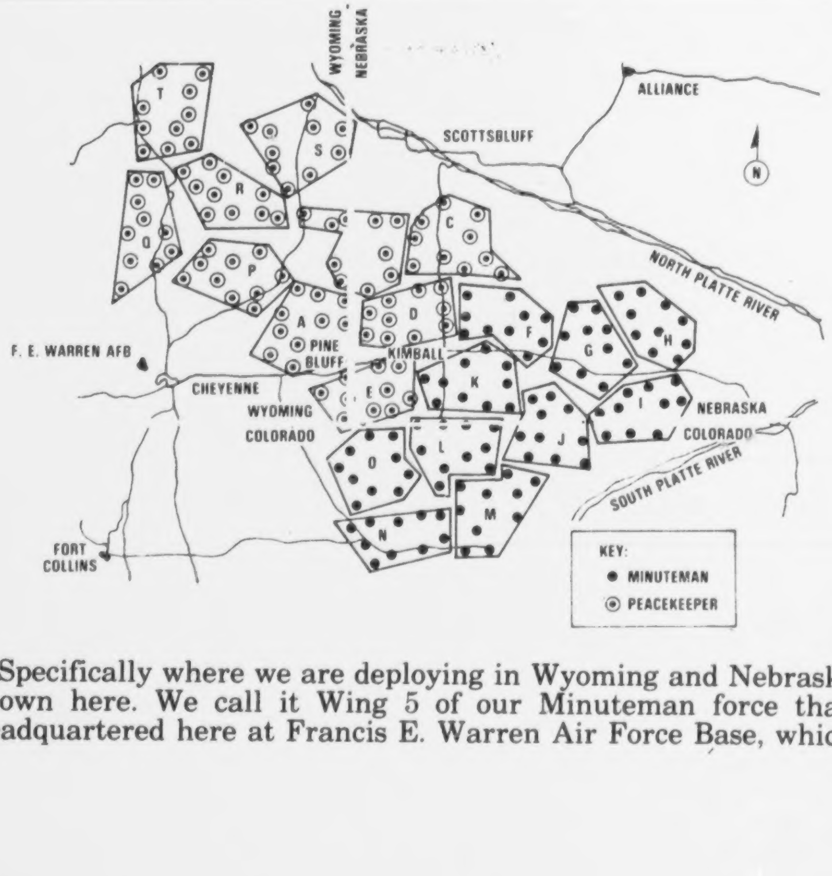
[Slide deleted.]

Turning a little bit in focus to what we are doing on the basing side of the equation, this is a schematic of a Minuteman site that has been adapted for the Peacekeeper deployment. This is the capsule in the silo arrangement, with the large concrete door cover, and then the equipment building which is adjacent to the launch facility and underground.

We are adapting those sites at Vandenberg specifically to replicate those that we have at Francis E. Warren, so that the results of our test flights that we will be firing from the silos at Vandenberg are exactly as those at Cheyenne, WY.

Our contractors are currently modifying the silos.

PEACEKEEPER IN EXISTING SILOS:
F. E. WARREN DEPLOYMENT—100


WYOMING
NEBRASKA
ALLIANCE
SCOTTSBLUFF
N
NORTH PLATTE RIVER
T
S
R
Q
P
C
A
D
PINE BLUFF
KIMBALL
F
G
H
E
K
I
J
L
O
M
N
F. E. WARREN AFB
CHEYENNE
WYOMING
COLORADO
NEBRASKA
COLORADO
SOUTH PLATTE RIVER
FORT COLLINS
KEY:
● MINUTEMAN
⦿ PEACEKEEPER

Specifically where we are deploying in Wyoming and Nebraska is shown here. We call it Wing 5 of our Minuteman force that is headquartered here at Francis E. Warren Air Force Base, which is just to the northwest of Cheyenne. We plan on deploying 69 MX Peacekeeper missiles in Wyoming. Thirty one of them will be located in Nebraska.

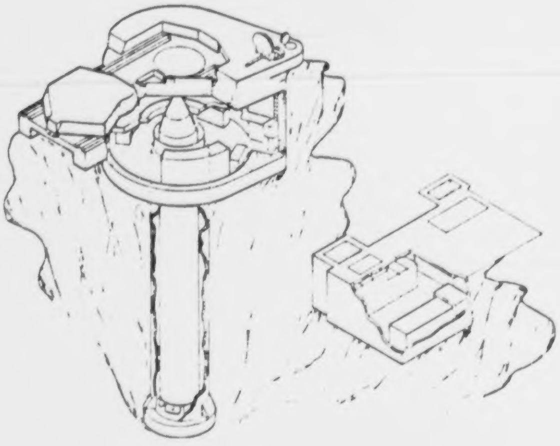
None of the sites in the south and east will be affected by the Peacekeeper deployment in any way.

The squadrons were chosen specifically by the President in his decision and confirmed by the Congress, that is the 319th and the 400th Strategic Missile Squadrons at Francis E. Warren AFB.

We will be deploying in those 100 sites, but we have maintained the same squadron integrity, the same communications, command and control network, and indeed, from a logistics standpoint, it is much easier to modify those particular sites from our center of activity here in Cheyenne.

We have filed our environmental impact statement as planned. We actually turned it in on January 30. It was due the 31st. So things are in order in the deployment area and I think they are going quite well.

PEACEKEEPER LAUNCH FACILITY MODIFICATIONS



INSTALL NEW CANISTER SUSPENSION AND SHOCK ISOLATION

MODIFY LAUNCH TUBE FOR ACCESS

MODIFY ENVIRONMENTAL/ ELECTRICAL SYSTEM CONTROL SYSTEM

MODIFY LAUNCH CONTROL SYSTEM

PROVIDE ALCC STATUS UPLINK

RETAIN HARDNESS

What we are doing to the individual launch facilities is focusing primarily on adapting it specifically to the Peacekeeper missile. Environmental systems, electrical cables, and connections will be modified. We will develop a large access for the guidance and control set that I showed you in the movie through a cutout. A major effort is focused on the shock isolation and suspension systems for our Peacekeeper missiles. All the modifications are to retain the same level of hardness that we have with our current Minuteman III silos. One bit of upgrade, though, is we do have KC-135 type aircraft that are capable of performing an airborne launch of the missiles themselves. We will be providing a status uplink from the individual silos to the aircraft so that they can monitor the individual status of each missile while the airplanes are airborne.

What all that says, sir, is, in our first year of procurement our 21-missile production program is on track. We will be able to meet our initial operating capability, which is designated as 10 missiles in 10 silos by December 1986. And all our production contracts are coming up, we are on line to ramp-up for our production activity.

PEACEKEEPER

($ IN MILLIONS)

	FY 83 & PRIOR	FY 84	FY 85	FY 86	TO COMPLETE	TOTAL
RDT&E	1912.6	1984.9	1716.3	852.3	344.5	6810.6
WPN SYS PROC	—	2079.6	2938.9	2780.4	6194.1	13993.0
QUANTITY BUY	—	21	40	48	114	223
DELIVERIES	—	—	—	6	217	223

SCHEDULE

SCOWCROFT COMMISSION	APR 83
FIRST FLIGHT TEST	JUN 83
IOC	DEC 86

Finally, in review, in the Peacekeeper program the RDT&E request for 1985 is $1.7 billion, $3 billion in weapon system procurements for the next increment, of 40 missiles that go toward our deployment. As you recall, the Scowcroft Commission report was turned in about a year ago now, and then when we got approval for our full-scale development and release of our flight test restriction, we launched immediately on June 17 and still have a high confidence that we will be able to obtain our December 1986 IOC at Francis E. Warren.

That summarizes the Peacekeeper activity. I would like now to turn to the second key ingredient of the overall modernization program, that of the small ICBM and hard mobile launcher program.

The roots of the small missile program are identical to those of our Peacekeeper deployment, in that the Scowcroft Commission recommended that a missile force be developed that is capable of holding the Soviet hard target base at risk. We need to do that with Peacekeeper-like accuracy. We should be able to carry a 1,000-pound payload over the 6,000 nautical mile range required to Soviet target base from southern positions of the United States.

The missile was to weigh approximately 15 tons as proposed by the Scowcroft Commission report. Most importantly, though, it was to carry a single warhead, and because of that single warhead it is not a MIRV'd system. It is a low-value target, but the size and the weight of the missile give it flexibility so that we could examine and keep open a wide range of alternatives in basing.

Congress then took that same Commission report and made some amendments to it and emphasized some key points. The first was the Price amendment on the House side, which restricted the missile weight in authorization language to 33,000 pounds. In fact, the Secretary of Defense must report to the Congress if the weight of the missile is intended to go over 30,000 pounds.

Importantly from a program standpoint, Congress tied the small missile program to key milestones within the big missile program. That says that by initial operating capability time of December 1986, when we will have 10 Peacekeepers deployed, our small mobile ICBM subsystems tests need to be demonstrated.

Additionally, by the time we have 40 Peacekeepers deployed we will have had to flight test significant subsystems and demonstrate their capability in a concept for a small mobile missile.

On the Senate side, Senator Glenn offered a resolution which I think passed unanimously to put the small missile program in the category of the highest national priority, like Project Apollo.

SMALL MOBILE ICBM DEVELOPMENT ACTIVITIES

- SMALL MISSILE PROGRAM OFFICE ESTABLISHED
  - BMO REORGANIZATION UNDERWAY
- SMALL MISSILE INDEPENDENT ADVISORY GROUP REPORT COMPLETED (SCHRIEVER PANEL)
- OSD SMALL MISSILE REVIEW PANEL ESTABLISHED
- SECDEF BIWEEKLY REVIEWS BEING CONDUCTED

The Air Force then, of course—and Dr. Cooper alluded to this earlier, set out very quickly to set up a program to integrate and implement those recommendations. We formed a small missile program under our Ballistic Missile Office at Norton Air Force Base in San Bernadino, CA.

We conducted an overall reorganization to handle that program, and as Dr. Cooper mentioned, Secretary Orr is committed to placing a general officer in charge of that program.

Additionally, we took what we considered to be the father of our Minuteman program, Gen. Bernie Schriever, and brought him in with a team of industrial and governmental leaders to examine the acquisition strategy that we had planned for the small missile program. He looked at that program and gave us a thumbs-up, a kind of seal of Good Housekeeping approval, if you will, as to the approach we were taking, and identified to us those things that he thought were a technical risk, and structured a program we believe that carries through the recommendations exactly of the Congress and the Scowcroft Commission.

Additionally, the Department of Defense under Secretary Weinberger has established, at the Under Secretary level a small missile review panel. I personally report to Secretary Weinberger on about a biweekly basis on the progress we are making in both the small ICBM and the Peacekeeper programs.

Dr. Cooper. Before you leave that, General Fornell, I would like to make a comment if I could, Mr. Chairman. I think when you go back and look at the intent of the Price amendment to bind us to deploying no more than 40 MX's prior to doing certain things with the small ICBM, I think the Congress did question the Air Force resolve and commitment to the small missile early on last year.

It was a program that came out of the Scowcroft Commission and quite clearly the Air Force was pushing, if you will, MX prior to that. We just want to assure the committee today that the small missile is getting attention at the highest level, not only in terms of management but also in terms of personnel and resources.

We are fully committed and I think we are moving about as fast as humanly possible right now on the small missile.

SMALL MOBILE ICBM CONTRACT STATUS

- SYSTEM DEFINITION CONTRACTS – DECEMBER 1983
  - BOEING
  - GENERAL DYNAMICS
  - McDONNELL DOUGLAS
  - MARTIN MARIETTA
- PROPULSION CONTRACTS – DECEMBER 1983
  - AEROJET
  - HERCULES
  - MORTON THIOKOL
  - UT CHEMICAL SYSTEMS DIVISION
- HARD MOBILE LAUNCHER CONTRACTS – FEBRUARY 1984
  - RFPs RELEASED
  - PRESENTLY IN SOURCE SELECTION PROCESS
- MISSILE GUIDANCE AND CONTROL CONTRACTS – FEBRUARY 1984
  - RFPs RELEASED

General FORNELL. Mr. Chairman, to show that same energy that Dr. Cooper alluded to, our best way to do that is to get underway and on contract as quickly as possible. As soon as the appropriations bill was passed and we actually had 1984 money available, we put requests for proposals out that focused on our program that General Schriever had recommended.

Immediately, the four major missile houses were under contract for concept validation and system definition for early study efforts, right away in December. That includes the Boeing Co., General Dynamics, McDonnell Douglas, and Martin Marietta.

Since we thought, and General Schriever concurred, that one of the technological challenges would be in the propulsion area, to gain the performance into that missile, we also thought we needed to put the propulsion houses that we had within the United States under contract as well. So therefore, Aerojet, Hercules, Morton Thiokol, and United Technologies Chemical were put under contract in a concept development, systems integration effort.

Just last week on February 28, after a very, very competitive source selection—we had nine original bidders—we selected four hard mobile launcher contractors, each exhibiting a different concept. Those are Bell Textron, the Boeing Co., General Dynamics/Convair and Martin Marietta.

We had a room full of potential competitors at the bidders' brief. We foresaw a very competitive environment for this particular concept, and have been very excited in dealing with that.

Senator WARNER. To clarify, you are now down to four to do what?

General FORNELL. To do the initial concept development in hard mobile concepts.

Senator WARNER. Four different competitive approaches?

General FORNELL. That is correct, sir.

Senator WARNER. Then you will select one?

General FORNELL. We will probably down-select to two in about a year, sir, and then we will have a head-to-head against those two for the eventual full-scale development program that is to begin in late 1986.

Senator WARNER. Is there any possibility you might have two different concepts in the mobile?

General FORNELL. We could, sir.

Senator WARNER. You will not rule it out at this time?

General FORNELL. No, sir. The main part of the program now is to keep as many alternatives open, and in particular, as General Schriever also recommended, it is to keep actual and real competition alive to the very last moment. That drives prices down, it keeps the innovative ideas flowing, and I think we have a very fine acquisition strategy in the small missile program.

SMALL MOBILE ICBM CONTRACT STATUS—Continued

TERMINAL FIX SYSTEM CONTRACTS – APRIL 1984
—RFPs TO BE RELEASED

MANEUVERING REENTRY VEHICLE CONTRACTS – MAY 1984
—RFPs TO BE RELEASED

GUIDANCE AND CONTROL TECHNICAL SUPPORT CONTRACTS – MAY, 1984
—RFPs TO BE RELEASED

Additionally, sir, very quickly, we have a request for proposals on the street for terminal fix system contracts. We have alternate missile guidance and control contracts. I am an Air Force man and I think our tradition has been to go nonexternal for updates. Therefore, we have always relied on an inertial system, but indeed we are examining ring laser gyros and stellar updates, as, a way of producing a competitive program to go against the baseline program we have identified.

Later on and lagging by 2 years, we are looking in concept at a maneuvering reentry vehicle, to indeed hold very hard targets at risk, where additional accuracy is needed, and to perform in a defended environment.

The guidance and control technical support, that is a very key one because it has to keep the interfaces open between all of the elements that we have competing with each other down to the final concept.

Senator COHEN. May I ask you if you support the concept of the MARV? Do you think that is a good idea?

General FORNELL. I think it is a good idea now, Senator Cohen, just to keep alive the option, in the event of Soviet continuation in the antiballistic missile work, or if the Soviet hardness activity continues at a level where we are unable to hold at risk those targets and we need additional accuracy.

I think it is wise just to specifically examine that concept, to see where we are. In fact, while we are sitting here there is a meeting going on to examine joint MARV study trying to link up with the Navy as far as a joint penetration aid approach, and where we will actually head in the maneuvering reentry vehicle direction.

Senator COHEN. General Gabriel testified at one of our prior hearings. He said that MARV may in fact be another genie about to be let out of the bottle, comparable to the case of MIRV's—in which about 10 years later we came back and decided we do not like MIRV's any longer and we think the Soviets have destablized the world situation by putting their SS-18's and SS-17's and SS-

19's out—and that we may have another little genie about to escape that we would come to regret.

Do you agree with that statement by General Gabriel?

General **Fornell**. Well, I agree with General Gabriel's statement, but he was addressing it in a conceptual sense, as I am trying to here. I think it is important from a military standpoint that we have the capability of doing the technology for future tasks.

If you are going to hold the Soviet hard target base at risk, you must have a reasonable level of accuracy. The mere prototype development of the MARV in a concept way now while adapting and keeping the options open, is the tough part. Therefore we need both the pre-full-scale development and full-scale development phase so that those options are protected should we come to the conclusion that a MARV is needed which you will have full review of as we go along.

Senator **Cohen**. What sort of guidance are you planning on? Are you planning on a guidance system dependent on GPS satellites?

General **Fornell**. Sir, we currently have a number of options open. We have a baseline. That is a term we use, baseline version of our MX Peacekeeper guidance system, which I refer to as the AIRS system.

We have a Northrup proposed version of that called lightweight AIRS, which is our baseline system. But the purpose of these alternative guidance systems is to bring along real competition as we down select and come to the full-scale development.

We have a development program where we have, flight test and system tests for technology evaluation; to be able to have a real competition to select the right system.

Senator **Cohen**. With respect to hardening of silos, have we made any developments now? There are reports that indicate that we have made some new breakthroughs in terms of hardening silos.

General **Fornell**. Yes, sir, and there is a whole part of my briefing that I will come to at the end which covers that. Would you like me to discuss it now, sir?

Senator **Cohen**. No. Go ahead with your presentation. But I do have to leave fairly soon.

General **Fornell**. It is right after these slides.

Dr. **Cooper**. Senator, may I comment on your MARV question?

Senator **Cohen**. Please.

Dr. **Cooper**. I guess I am probably as keenly aware as anyone in the Pentagon of the sensitivities on this side of the river on MARV. I want to assure you that we have no plans to deploy a MARV warhead on the small missile at this time. We have baselined the Mark 21, which is the same warhead that is going on the Peacekeeper. We have no plan at present to put a MARV on either the Peacekeeper or the small missile.

This is a technology effort that could be followed by FSD, and I think the conditions under which it would follow requires a complete and total breakdown in our arms control efforts. We are also concerned about the genie getting out of the jug. This is simply a hedge.

But the point I would like to leave with the committee is that the baseline program has the Mark 21 warhead and not a Marv warhead.

Senator COHEN. So there is no MARV being developed for the small ICBM?

Dr. COOPER. There is a MARV technology program being examined as an option in the future, but there is no plan to deploy it at present. It is a hedge.

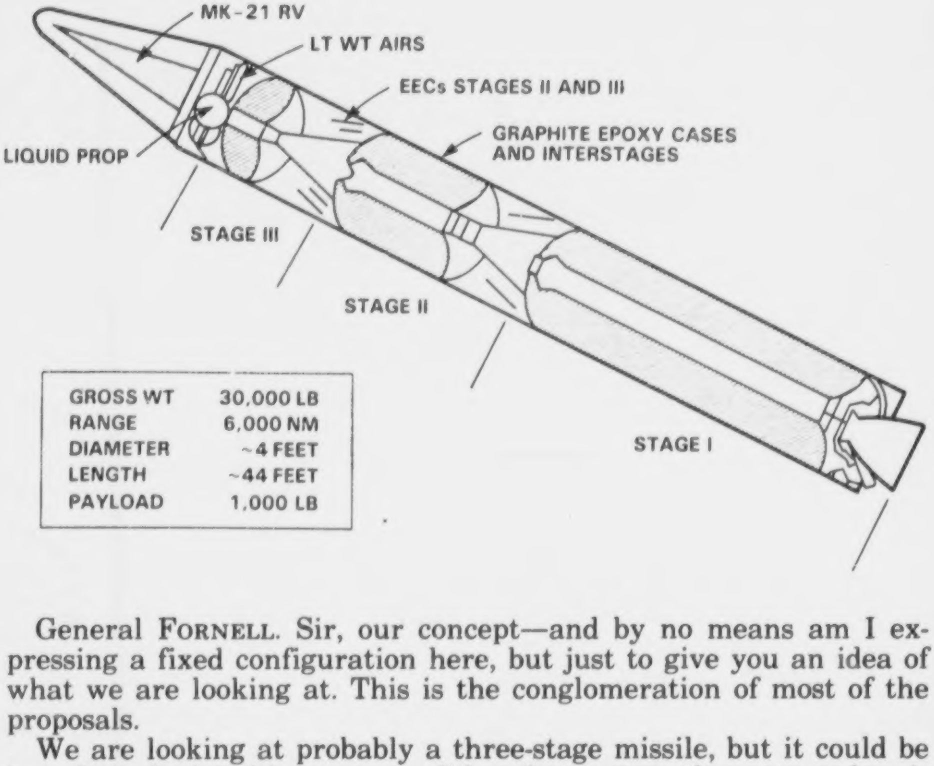
Senator WARNER. Well, let us be clear, because that is an important question and issue that we will address in floor debate. The research is being performed such that a future President can have the option to deploy a MARV, is that it?

Dr. COOPER. Yes, sir, that is correct.

Senator WARNER. You will bring that research to a threshold, assuming it is technically achievable, where it simply is a decision of go or no-go deployment to be made by some future administration?

Dr. COOPER. Mr. Chairman. I would also add that I am sure that it will be in full consultation with the Congress.

MISSILE CONCEPT



GROSS WT	30,000 LB
RANGE	6,000 NM
DIAMETER	~4 FEET
LENGTH	~44 FEET
PAYLOAD	1,000 LB

General FORNELL. Sir, our concept—and by no means am I expressing a fixed configuration here, but just to give you an idea of what we are looking at. This is the conglomeration of most of the proposals.

We are looking at probably a three-stage missile, but it could be two. It is depicted here as a solid rocket motor, three-stage, but it could include a liquid stage, because a liquid stage can be turned on and off very precisely for deployment of the reentry vehicle, it has certain advantages.

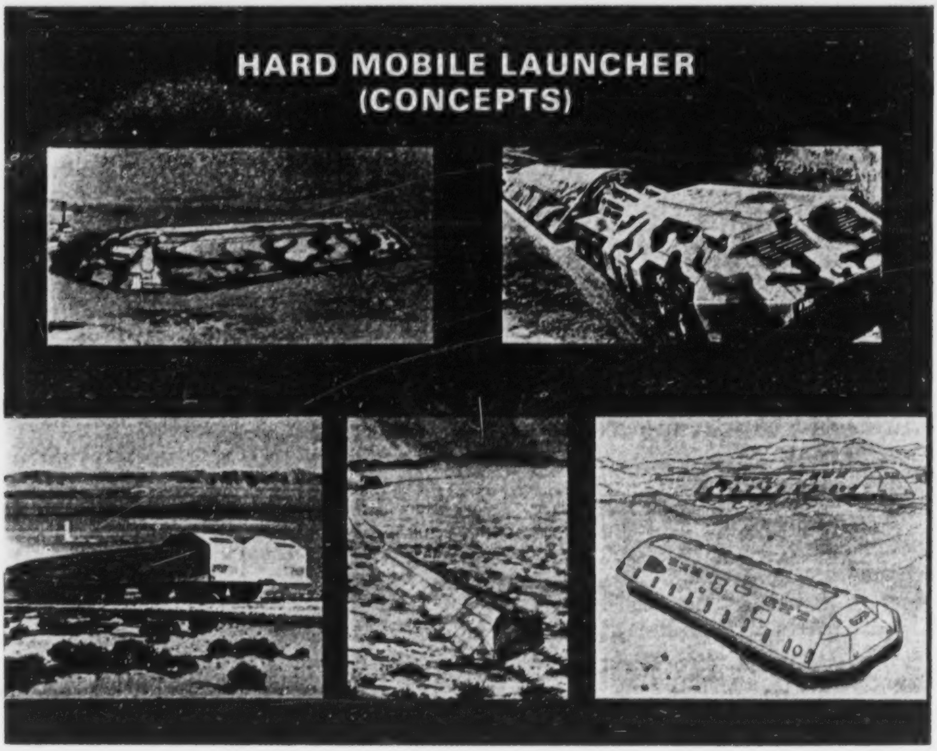
You notice a lot of composite materials that we use for strength and reduce our weight and gain performance in both the engines and the inner structure. Lightweight AIRS is baseline. A single Mark 21 reentry vehicle is the baseline.

As I indicated, I have not seen one proposal that exceeds 30,000 pounds. They can all make the 6,000 nautical miles and a 1,000 pound payload, which is important.

The key here, of course, is that we are protecting the mobility of the vehicle, no matter what. So that this missile is integrated and interfacing with our hard mobile launch concept, so that this missile fits inside any of those concepts that we have under examination for hard mobile launchers.

Dr. Cooper. Is CEP up there?

General Fornell. CEP is in the Peacekeeper class, sir. CEP would be classified. I can talk about that later, but it is the same as Peacekeeper, so we are not driving technology. We are taking what we have available that has come down the road through the development program of the MX Peacekeeper guidance.



Some of the concepts that I wanted to show you are included here. These are our four major concepts. This vehicle [indicating] is an air cushion vehicle. The General Dynamics version is here, the Martin Marietta version is here.

All carry a single missile capable of withstanding 30 psi minimum of blast overpressure, 10 psi while mobile. We put a goal of 100 psi in the RFP's, and to show you the difference, we put that goal, on the program as a cap so that people would not come in with a 200 or 300 psi kind of vehicle. But indeed, they will be graded on the 30 psi achievement in their proposals and work.

Senator COHEN. That is not I-95 up there in the left-hand corner, is it?

[Laughter.]

General FORNELL. That is the Boeing proposal.

Senator COHEN. Well, I know that is a highway up there and it generates a lot of static.

General FORNELL. Sir, that is an unimproved road there. [Laughter.]

OPERATIONAL CONCEPT OF MOBILITY

Senator WARNER. Now, let us discuss your operational concept of mobility. Is this to be confined to a certain geographic area of the United States? Will it utilize in any way the existing highway structure?

General FORNELL. Sir, we are again keeping open all options at the moment. I will say that if we are able to achieve—and I have reasonable confidence that we will achieve—the levels of hardness in these vehicles, the payoff of that is that it allows us to base it on currently owned DOD land and installations.

I can give you my best guess of an operational concept. General Russ heads a steering group where we are now nurturing and building the operational concept to go with a small missile. They are, again, examining all the options that I have described so far.

But essentially, I believe it will be based on something like one or more of 12 major military installations. It will be moved to presurveyed positions in one of these kinds of modes. We will have a redundant communications, command and control network, either from an airborne launch facility or mobile hardened launch control facility.

The vehicle will be moved within the intelligence warning cycle for survivability and to minimize the public interface kind of things that we have to deal with in consideration of a soft, mobile system, for example.

Now, that is just my version of a preliminary concept from listening to a lot of people. I think that it is totally open and we will adapt it in the best way. The Strategic Air Command is playing very heavily in the development of that operational concept.

Senator WARNER. In summary, it will have its own highway system integral to existing or, if necessary, newly acquired military installations, and there will be minimal interface with our current infrastructure of civilian systems?

General FORNELL. Yes, sir. And of course, we will examine whether you rely on a tactical or strategic warning as such, whether it is outside the gate or stays inside the gate. Those are the decisions we will also make in full consultation with the Congress.

General RUSS. Senator, if I may add one thing, the diagram on the bottom left-hand corner, there is an air-cushion vehicle. Now, this vehicle would not have to travel on roads. It could travel across marsh, snow, and various types of things. So when he says we are keeping our options open, if we should come up with that sort of concept, certainly we would plan on operating it and dispersing it differently than we would one with roads.

Dr. COOPER. Mr. Chairman, one other point that I think we should clarify if it has not been made clear is, the reason we are striving for the hardness is there is a relationship between the hardness, the ability of the vehicle to withstand the blast overpressure, and the amount of area that we will need to operate. The harder we can make the vehicle, the smaller the area.

The third parameter that comes in is the weight. We are also working at that. We can certainly make a vehicle that is 30 psi hard or even 100 psi hard, but it may come at great expense to weight. There is a tradeoff there, because if you get the vehicle too heavy then it is not mobile. So these are the tradeoffs that we are examining.

Hopefully, we will be able to bring hardness, weight, area and cost into reason so that we will be able to operate on DOD lands only. That is our desire right now.

RELOAD CAPABILITY

Senator WARNER. What about reload capability?

Dr. COOPER. Our concept is fully mobile.

Senator WARNER. I understand mobility. But what about reliability, reloading? The missile is expended or fired off. Does that vehicle survive, or is that classified?

General FORNELL. I think the options, Senator, are open at the moment. We are not into that specific design point yet, but certainly that would be a consideration as we go downstream.

Senator WARNER. Senator Cohen, would you like to proceed to a certain portion of this briefing? I am perfectly willing to do that.

Senator COHEN. I do have to run.

Senator WARNER. Well, why do we not take your point now and then I will remain here for the rest of the afternoon.

General FORNELL. I will show you a little bit of some of the hardened work that we have done.

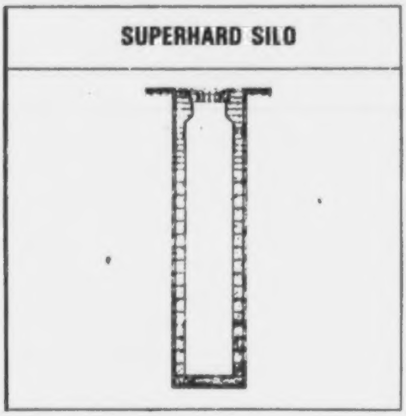
[A short film was shown.]

This is a test that we have conducted. It is a simulated 1 kiloton blast that blows up. We had scale-down vehicles located around that blast to check for the overpressure. It was called Direct Course. It was done at White Sands.

Also, we do additional tests that are less expensive. This is a blast tube test where we ignite an explosion to generate a blast wave. We put test models inside to check the blast and overpressure wave that passes by. Here is the blast, and we examine it to be sure that the shapes of those vehicles that we have now under study are feasible.

General FORNELL. I would like to turn to Senator Cohen's concern, and then we can branch off to whatever area you would like to discuss.

FOLLOW-ON BASING TECHNOLOGY



SUPERHARD SILO

- JOINT BMO/DNA PROGRAM
- 1/5-SCALE TESTS COMPLETED IN FY 83
- 1/3-SCALE TESTS PLANNED FOR FY 84
- SCALE-MODEL TEST OF SHOCK ISOLATION SYSTEMS IN PROGRESS
- LARGE-SCALE TESTS PLANNED FOR FY 85 AND FY 86
- APPLICATION TO SMALL ICBM AND/OR PEACEKEEPER

We have continued our follow-on basing technology work, and that is a joint Air Force-Defense Nuclear Agency project. During 1983 and the early parts of 1984, we have conducted a number of scale tests which have given us additional confidence in our ability to design and build a super-hardened silo structure.

We plan on a full-scale test that would be conducted in early 1986, and of course the application of the technology is useful either in a small missile or in a Peacekeeper basing mode.

The work that we have done is primarily concentrated on the way that we build the silo itself. One of the major points that we have discovered is that structures of concrete and heavily reinforced steel are very resilient, when we put a steel inner liner inside that confines the concrete, tests show that these structures are capable of withstanding overpressure and nuclear effects associated with an explosion to a much greater degree than we ever thought possible.

Additionally, the work that we have done—on a subsequent slide I will show you—in cratering has given us indications that crater size is much smaller than the data we collected during the aboveground nuclear tests in the Pacific with wet soil. During tests and experiments we have conducted in loose, dry soil, which is more like that where our silos are actually based, instead of the large, saucer-type cratering that was evidenced in the Pacific, we have a crater that looks like a shell or soup bowl, but of a much smaller diameter.

Now, that is significant in that if we are able to build this kind of structure capable of surviving 20 to 25 times higher overpressure and the craters are smaller, therefore we have increased survivability. The old technology with large craters, and much softer silo, therefore being less survivable.

But what we do is, we build those silos, we simulated a large nuclear explosion. We excavate afterwards and detect a minimal image. Our damage criteria is based on the launchability of a missile from one of those silos.

Additionally, in our cratering work, we place high explosives and tamp the area to absolutely propagate the same kind of environment that you would find during a nuclear explosion, for determining the size and especially the debris that is thrown out of a crater, because that tends to cover up the silo and inhibits your launch.

I have a picture here of one of those cratering tests., Here you can see very vividly the bowl effect, rather than that very wide and large saucer-type cratering that is evidenced even now in the Pacific test sites.

I have a chart on our deep basing program, sir. This is our deep basing effort, which shows promises for other missions as well as a specific basing mode for any missile system.

We talk in terms of a strategic reserve force. Current efforts are used as an extension of the national command authority, logistics, power those life support and things needed for long-term survival. We have a fairly extensive program review scheduled within the Department of Defense, expecting guidance and direction as to the long-term focus of this particular effort.

We did complete a number of significant egress tests at the Nevada test site utilizing large excavation devices that build subways to find our way to the surface. I do have a short film clip of that type of activity.

[A short film was shown.]

This is some of the cratering work that we do. This is the replication of a nuclear burst and the upheaval of the soil in determining those crater sizes that now exhibit a much smaller diameter than previously thought. These tests were also conducted in New Mexico.

Senator **Warner**. What happens when it comes down and piles up on top of the silo? Are you about to show us what happens now?

General **Fornell**. That was just a test, sir. This is part of our deep basing effort. That machine which you saw is the kind of subway-drilling machines that we used. What we did is we located these 200 feet underground at the Nevada test site and then drilled vertically through 150 feet of solid rock and then into a rubble zone, finally gaining access to the surface.

Senator **Warner**. Well, I think I have an idea of how this functions. Please go on.

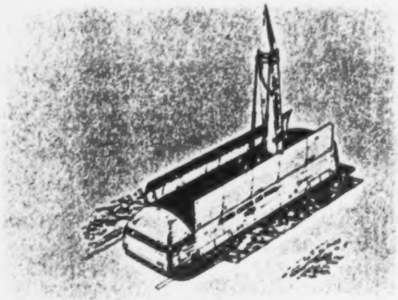
SMALL MOBILE MISSILE AND ICBM FOLLOW-ON BASING

$ IN MILLIONS

	FY 83	FY 84	FY 85	FY 86	TO COMPLETE	TOTAL
RDT&E	—	467.3	724.5	643.7	TBD	TBD

FY 85
RDT&E REQUEST

$	724.5
SMALL ICBM AND HARD MOBILE BASING	465.2
ICBM FOLLOW-ON BASING TECHNOLOGIES	259.3



THESE TWO INITIATIVES ARE STILL BEING DEFINED. THEREFORE FY 87-FY 89 AND TOTAL ARE TBD

SCHEDULE

SCOWCROFT COMMISSION	APR 83
SCHRIEVER GROUP RECOMMENDATION	SEP 83
HARD MOBILE LAUNCHER CONTRACT AWARD	FEB 84

General FORNELL. In summary, on the small missile effort and the ICBM follow-on technologies, we are asking for $724 million in 1985 for all these efforts, which are divided between the hardened small missile concepts at $465 million and the hardened silo, deep basing efforts at $259 million.

Here again, the Scowcroft Commission gave us our guidance in their recommendations. General Schriever recommended and gave us a blueprint for our acquisition strategy. And as I indicated, on the 28th we awarded our first hardened mobile launcher contracts for concept development.

In summary, Mr. Chairman, we believe that the deployment of 100 Peacekeeper missiles in existing Minuteman silos begins to address the military capability that our Minuteman III force does not possess to hold those prompt hard targets within the Soviet Union at risk.

It provides them an incentive to move toward small single-warhead mobile missiles, we believe bringing a greater level of deterrence, primarily by decreasing the overall number of weapons that both nuclear arsenals contain, and a level of stability that we do not have currently.

That concludes the formal portion of my remarks, sir, and I stand ready to answer any questions that you may have.

Senator WARNER. Senator Levin, we have completed our general overview and I am prepared now to ask some questions in open session, and then we will go into a closed session.

Gentlemen, during the course of the deliberations of the subcommittee, as well as the full committee, and most certainly on the floor of the Senate, we will have to examine this program—that is, first the MX, the Peacekeeper—as a possible area for obtaining some reduction in the defense budget.

Secretary Cooper, why do you not take us through the contractual problems first.

Dr. COOPER. Mr. Chairman, do you mean the contractual problems if we were to reduce the production numbers?

Senator WARNER. That is correct.

Dr. COOPER. Of course, our request is for 40. Last year, as you recall, the request was for 27, and that was reduced by 6, so we ended up with 21. This year's request is for 40. There is nothing there that contractually we could not handle.

What would happen if the request were to be cut is the typical thing that happens, the deployment schedule is stretched out and there is an ultimate attendant cost that goes along with stretching the program.

Senator WARNER. When I said "contractual," that was the sort of thing I was referring to. You have contractual problems, operational problems, arms control problems, and you have cost problems. Let us treat them all.

Let me pose a hypothetical question. Suppose the Congress were to state that we will buy only 20 of the missiles requested in fiscal year 1985, or to cut in half the number of missiles that we buy. The funding for RDT&E would probably remain the same, would it not?

Dr. COOPER. Well, whether we procure one missile this year or 20 or 40, it should not impact the test program, and that is essentially where we are now, in the test phase.

Senator WARNER. To the extent there is any flexibility it would be in the procurement?

Dr. COOPER. Yes, sir.

Senator WARNER. Now, let us take a hypothetical that we cut it in half. What are the problems?

Dr. COOPER. Well, again, Mr. Chairman, as I said, the two basic problems if you were to cut the program is that the deployment would be later, and we would not complete the deployment as presently scheduled.

Senator WARNER. That is full deployment?

Dr. COOPER. Full deployment, the 100. That would occur at a later date, assuming you did not go in and double up, and that would be very difficult, next year. The production ramp would be slowed as a result and there would be an attendant cost to that.

I do not have the precise figure of what happens to the total cost if you go from 40 to 20, but there would be some significant cost increase to the program. Those are the two classic things that happen when you cut a production line.

Senator WARNER. Do we have the chart there that showed the 40? It was about $2.9 billion, was it not? What is that request in there?

General FORNELL. Sir, $2,938.9 million is the exact number of procurement for 40 missiles, sir.

Senator WARNER. So it would be easier to just use the $2.9 billion. If Congress were to cut that in half, to cut the number in half, what number of dollars do you need to get 20 missiles?

Dr. COOPER. Mr. Chairman, again, I do not have that off the top of my head, but I do have a letter here that was written in response to a letter from Senator Exon to the Chairman of the Joint Chiefs of Staff, General Vessey. And it just so happens that that particular question was asked, and if I might, the letter is classified, but this particular section is unclassified. Let me just read from the letter.

Senator WARNER. Let us have a date and time here for our information.

Dr. COOPER. It is February 11, 1984, a letter to Senator Exon from Chairman Vessey. And referring to the reduction, it says.

"More significantly, the reduction of fiscal year 1985 Peacekeeper procurement by 50 percent"—and that is the 20 missiles you referred to—"would result in short-term reduced costs, but the long-term penalties are severe." And I continue to quote: "The reduced level would not achieve the required operational capability of 100 missiles by December 1989. The fiscal year 1985 cost would be reduced by an estimated $550 million."

Senator WARNER. Now, off the $2.9 billion?

Dr. COOPER. Yes, sir, off the production number. There would be no impact to the tests.

Senator WARNER. I understand that. But if you take $2.9 billion and all that would recoup by way of reduction is roughly a half billion dollars?

Dr. COOPER. That is according to General Vessey's letter.

Senator WARNER. So the 20 missiles would cost $2.4 billion?

Senator LEVIN. Is that budget authorities or outlays?

Dr. COOPER. That is obligational authority. That would be the number in the bill.

"However", it says, "to defer the 20 missiles to the end of the production line would require the addition of $950 million in the out year budget, due to reduced production efficiency and inflation. The suggested reduction would procure fewer missiles in fiscal year 1985 than are already funded for fiscal year 1984. The result is a significant cost penalty in a year when we would normally be bringing production to a cost efficient and sustainable rate."

Senator WARNER. Well, back again, Mr. Secretary. $2.9 billion for 40 and you are advising this committee that if the committee cut the number to 20 missiles in 1985, it would cost $2.4 billion?

Dr. COOPER. Mr. Chairman, as I mentioned before, I am simply quoting to you from a letter from General Vessey. I will stand by that, but what I would like to do for your benefit is verify that for the record. That is the number that I have right now.

General Fornell?

General FORNELL. Mr. Chairman, the key ingredient there is, in fiscal year 1985 part of the $2.9 billion you are addressing is going toward the basing effort. That is purchased with procurement dollars, which is broken out between flyaway, other weapons systems, and support. So when you take out a given number of missiles, the apparent amount of money available for the missile flyaway by itself is not as readily apparent as you would expect.

We are purchasing pure missiles in 1984, but the timing of all the requirements for this large and complex program to come together, the 1985 request contains a significant amount of basing-related costs. So a mere deletion of the missiles does not yield the type of return that I think you are expecting.

Senator WARNER. You are being very clear on this and I understand it. The point is that we will need this material in our debate, in our consideration. So what I would request now is that you provide for the record the consequences of possible actions by Congress, assuming we leave the RDT&E flat, if we would halve the number of missiles from 40 to 20, then we would also halve the total funding for the procurement account as an option other than halving the missile.

In other words, if Congress is determined—and I am not suggesting by this question my disposition on the issue, but if Congress is determined to invoke some savings in this particular military system, it might approach it in one of several ways. By halving the number of missiles to be authorized or, as I say, somewhat arbitrarily halving the amount of money for the procurement account.

If you would give us a profiled breakout of either of those actions, we would appreciate it.

Dr. **Cooper**. We will do that, Mr. Chairman.

[The information follows:]

Reduction in Peacekeeper Missiles

If the fiscal year 1985 request for 40 Peacekeeper missiles were cut in half to 20, and the fiscal year 1985 basing and support funding for the missiles purchased in fiscal year 1984 were retained, missile procurement could be reduced by about $600 million.

If Peacekeeper procurement funding were arbitrarily cut in half, $1,469 million would remain. This level of funding would permit achieving the Congressionally-mandated Initial Operational Capablility of 10 missiles on nuclear alert by December 1986. However, the remaining tasks of procuring additional missiles and procuring basing to deploy more than 10 missiles, and procuring support items for those missiles to be deployed would require prioritization and program rephasing.

Both of the suggested procurement alternatives disregard a key Scowcroft Commission recommendation: that Peacekeeper missiles are the near-term solution to the current U.S. and Soviet asymmetry in countermilitary capability and that deployment of 100 Peacekeepers should be accomplished as soon as possible. Peacekeeper should not be a candidate for budget reduction because it is a key near-term element in the balanced program for U.S. strategic modernization.

Dr. **Cooper**. What I might suggest is that we give you a breakout of what the production number would look like for 20 missiles and what the production number would look like for 30 missiles and what you already have, for 40 missiles. That will give you some feel.

We can take back the number or the request for halving the budget. I would suggest that it would be a major perturbation in the program if we were to do that, because a large portion of that are nonrecurring costs, that we have to spend whether we produce 1 missile or 40 missiles in fiscal year 1985.

Senator **Warner**. I understand that. But of course, there are the responsibilities of Congress toward this deficit situation, and it may well be that Congress will have to determine that *x* dollars have to be funded from this particular account. I just want to be sure that I am able to articulate the consequences.

Dr. **Cooper**. I understand.

General **Fornell**. Mr. Chairman, for clarification, of the 40-missile request for 1985, 30 missiles are scheduled for deployment at Francis E. Warren in silos. Nine of the forty go toward the follow-on, Strategic Air Command-conducted follow-on operational test and evaluation flights that occur during the lifetime of the program. And one missile goes toward what we call the logistics command aging and surveillance program.

It is important to gain one missile from that initial early-on buy to begin your aging and surveillance program, as we have in Minuteman, and observe how performance is affected over the lifetime of the missile.

Senator WARNER. Mr. Secretary, you have had, fortunately, a wealth of experience here in Congress before you joined the Department of Defense. You know the ramifications of these debates as they will arise. Therefore, in responding to this question, please place yourself in the position of Members of Congress and provide us with the information so that we can make an informed judgment.

Dr. COOPER. I understand the sense of your question, Senator, and we will do that. While we would regret it if Congress had to cut the missiles, I understand the situation that you face and we will respond accordingly.

Senator WARNER. Now, we have covered the contractual aspects. You should also have a parallel response as it relates to the impact on the strategic situation. I think it would be helpful if, in open testimony, we were to address that issue now, and then have a further submission for the record.

Dr. COOPER. Mr. Chairman, what I would like to do is ask General Shaud to do that. That is what he makes his living doing, looking at operational impacts. So if I could, I would like to ask him to address that question.

General SHAUD. Mr. Chairman, let me answer in two ways. First of all, the operational requirement, as you know, right now, with the hardening of SS-18's and 19's that are in virtual sanctuary from the capability we have today—if we step away from the production of these missiles to take that sanctuary from the Soviets, that is indeed an operational impact that we think is not wise.

Senator WARNER. You are characterizing the SS-18's and the 19's as being virtually in a sanctuary now, in the totality of all of our strategic systems?

General SHAUD. As far as an ICBM response, and I had better go into closed testimony to follow up on that.

Senator WARNER. I wanted to make sure that it limited that to ICBM's.

General SHAUD. Yes, sir, that is exactly right.

The second point is, with regard to strategic modernization as it influences our arms control, as it influences our talks. I think as you well know, sir, the perception of what we are doing, the support of our strategic modernization program, has an awful lot to do with how successful our negotiators will be at the table.

I think I could encapsulize my two operational impacts in terms of those remarks, sir.

The other perhaps is with regard to the nine missiles that we need for testing and evaluation downstream. What this enables us to do, of course, is to maintain some idea of the reliability of the system, particularly when it is initially deployed, and we need about seven to eight missiles per year in order to maintain our confidence that what we have deployed is working properly.

The missile business is just a little bit different than the aircraft business, in that during operational readiness inspections and so forth obviously you cannot fire one. So our OT&E programs over the time, over the operational life of the missiles, are very, very important. And with leadtime away, those nine missiles will help us get started on time in 1987.

Senator WARNER. Now, given the hypothetical, gentlemen, is there any other testimony you wish to provide here today in open session?

Dr. COOPER. Mr. Chairman, I think that is all we have in open session.

Senator WARNER. On this question that I have propounded of a potential decision by Congress to reduce either in numbers or dollars the amount of money that flows into this particular weapon system?

Dr. COOPER. Mr. Chairman, I would like to just stress once again the two points that General Shaud made, the first being that there is an asymmetry today that exists between the Soviet Union and the United States' ICBM forces. They put at risk a class of targets with their ICBM's that we do not hold at risk in a reciprocal fashion. We believe that there is an operational need to reverse that or at least to bring asymmetry there.

Second, we believe having the Peacekeeper deployed gives us great leverage in our arms control discussions with the Soviets.

Senator WARNER. This subcommittee will be taking additional testimony on the arms control issue from other witnesses, and at this time I would defer to my colleague, Senator Exon.

Senator EXON. Thank you, Mr. Chairman. I will defer to my colleague from Michigan, who was here earlier. I came in late as I was detained. May we proceed with him first?

Senator WARNER. Of course.

MX MISSILE

Senator LEVIN. Thank you very much. I have just a couple of questions.

We will not argue the whole MX value here today again in terms of wiping out asymmetries with 100 nonsurviving warheads and what it does in terms of the arms control negotiations. That has been debated before and will be again, but I will not by my silence at least acknowledge that we wipe out any asymmetry with 100 MX missiles that do not survive.

Dr. COOPER. Senator, not to be contentious, but what we believe, in concert with the other two legs of the triad, is that that does constitute a survivable force. The name of the game here is deterrence, and we believe that that combination will deter, and that is our purpose in deploying the system.

Senator LEVIN. Well, it is the other two legs of the triad that give it to you and not this, because these cannot survive a first strike. The only value they have in terms of wiping out that asymmetry is if we launched the first strike or launched on warning.

In a rideout situation they are almost entirely wiped out. At least that is what we used to be told, that they would be wiped out entirely. We were told until last year that only 5 percent of our land-based missile forces would survive a Soviet first strike if we chose to rideout the attack and not launch under attack or launch on warning.

Last year that testimony changed and suddenly the Air Force claimed that 30 percent of our silo-based missile force could survive under these conditions. What is your rate this year?

Dr. COOPER. Senator Levin, I do not have a new rate to bring you, and I do not have those numbers off the top of my head. I think it is a range that was estimated, that went down to a low of something on the order of 5 percent to a high of 30 percent. But I am not prepared to discuss that in detail. I just do not have that.

Senator LEVIN. Well, until last year we were told it was 5 percent. Last year we were told it was 30 percent. This year it is somewhere in between?

Dr. COOPER. It is in that range, Senator.

Senator LEVIN. But that is a pretty good range.

Dr. COOPER. Well, it may be that that is the range of uncertainty. It is still a low number.

Senator LEVIN. Could it be that whether it is 5 percent or 30 percent depends on the purpose for which it is being argued?

Dr. COOPER. No, sir.

General SHAUD. Sir, as we testified earlier, it depends entirely on the scenario that you construct. For example, if it were to be an SLBM attack on our bomber base and the President would seek to retaliate, practically the entire missile field would survive. On the other hand, if you accepted a laydown with a rideout scenario, the survival would be just about zero.

Senator LEVIN. Mr. Chairman, the question the Chair asked about reducing the production rate——

Senator WARNER. The Chair put two questions to the witnesses, hypothetical, of course, and not to indicate the Chair's disposition. If Congress made a decision to reduce by one-half either the number of missiles or the funding to the procurement account.

Senator LEVIN. Mr. Chairman, to seek that information, for whatever purpose one might seek it, I would like to submit for the record an excerpt from the CBO report entitled "Reducing the Deficit: Spending and Revenue Options," where they look precisely at that issue, and the figures that they come up with are dramatically different than what the Air Force has given us today, may I say, and that is that essentially the savings if you went down to a production of 20 this year would be $1.6 billion in budget authority and $300 million in outlays.

I would like to insert this for the record.

Senator WARNER. We will insert that into the record.

[The information follows:]

REDUCING THE DEFICIT: SPENDING AND REVENUE OPTIONS

A REPORT TO THE SENATE AND HOUSE COMMITTEES ON THE BUDGET—PART III

4-7. LIMIT PRODUCTION INCREASES OF THE MX MISSILE

[In millions of dollars]

Savings from administrative request	Annual savings					Cumulative 5-year savings
	1985	1986	1987	1988	1989	
Budget authority	1,600	1,600	1,500	1,600	−1,000	5,300
Outlays	300	900	1,300	1,400	−1,000	4,900

The MX missile is a new-generation land-based intercontinental ballistic missile (ICBM), which the Congress first authorized for production last year after ten years of development by the Air Force. Capable of delivering 10 high-yield nuclear warheads and weighing nearly 100 tons, the MX will be the largest, most accurate ballistic missile in the U.S. arsenal.

Debate on the MX program has been extraordinarily contentious. After many unsuccessful proposals for deployment, the administration finally decided to buy 223 MX missiles, enough for operational testing and backup and to deploy 100 missiles in existing missile silos. The program cost would exceed $34 billion. The Congress endorsed production of 21 MX missiles in 1984, and administration plans call for increasing production to 40 in 1985 and 48 in 1986 and beyond.

Following the lead of the President's select commission to study the MX (The Scowcroft Commission), the administration no longer justifies the MX primarily as a survivable addition to the strategic nuclear force, since the Soviets could theoretically destroy most of the missiles during a first strike attack. Instead, the MX serves as a demonstration of U.S. willingness to proceed with force modernization and an inducement to the Soviet Union to negotiate in good faith for arms control.

The Congress could choose to limit annual MX missile production to the 1984 rate of 21. This course would continue MX production, demonstrating U.S. commitment to strategic modernization, while allowing the Congress to observe developments on arms control before deploying all 100 missiles. Should full deployment be desired, limiting production now would extend by a few years the conclusion of the deployment program. Although limiting production rates would increase unit costs, it would provide savings of $5.3 billion in 1985-1989 compared to the administration's plan.

Senator WARNER. We will ask the Department of the Air Force in their response to this pending question that the CBO report be specifically addressed as a part of their response.

Senator LEVIN. It is a significantly different figure than we have been given.

Senator WARNER. In fairness, Senator I am not sure that Secretary Cooper gave a figure. He did cite a letter from General Vessey.

Senator LEVIN. Excuse me. It is General Vessey's figure that is dramatically different. It was not the Air Force's figure.

[The information follows:]

CBO AND GENERAL VESSEY PEACEKEEPER FIGURES

Senator LEVIN. The CBO report entitled "Reducing the Deficit: Spending and Revenue Options" states that $1.6 billion can be saved in FY 1985 if Peacekeeper production is limited to an annual rate of 21 missiles. In a letter to Senator Exon, General Vessey stated that if the FY 1985 Peacekeeper missile buy were reduced to 20 missiles, the cost would be reduced by $550 million. Why are these two figures so significantly different?

Dr. COOPER. The CBO figure assumes that since about half the missiles are reduced, about half the procurement funding should be reduced. This assumption is incorrect. The FY 1985 request is composed of four areas: flyaway (missiles), other weapons system (basing), support and initial spares costs. FY 1985 is the first year

for basing and significant support and initial spares procurement. The funding for these areas is determined by the number of FY 1984 missiles already approved. Thus, reducing FY 1985 missiles only reduces the flyaway costs of $1,786.8 million. The flyaway costs, in turn, cannot be reduced by half since the unit cost learning curve is still steep in FY 1985 and the last 20 missiles on the FY learning curve are the cheapest in terms of unit cost. General Vessey's figure was based on these programmatic considerations and that is the reason for the significant difference.

Dr. COOPER. I assume that it is also the Air Force figure, but we will go back and check that for you, Senator.

The other point I would like to make, Senator, is we do not see it as a savings. It is actually a cost to the program if you maintain 100 missiles.

Senator LEVIN. Well, it is always true that we can increase to 60 this year and make savings and the production run would be a lot larger. It is always true that the more we buy the cheaper per unit. I am sure of that.

But the point is that in 1985, according to the CBO, we would save $1.6 billion in budget authority and $300 million in outlays. The argument you make about what is a cost-effective rate of production and all that and we would save if we produce 40 over 20, is always true. If we brought anything in greater quantity, just about, we would save on a per unit basis. If we got things deployed quicker, we usually will save money.

But my point here is that, since these are different figures than General Vessey's figures, I thought I would insert them in the record and then we can have all of the figures in the record.

I read somewhere that the Governors of the two States where the MX will be deployed now want a year delay on deployment. Can you tell us if that is true? Has there been a request by those Governors to delay that?

General RUSS. Yes, there has, Senator Levin.

Senator LEVIN. Was that in a letter to us?

General RUSS. Sir, it was in a letter to the President.

Senator LEVIN. Can you give us a copy of that letter for the record?

General RUSS. Well, it was a letter to the President. I am not sure.

Senator LEVIN. Could you seek to obtain it so that we could have that in the record?

General RUSS. Yes, sir, we will take that back.

Dr. COOPER. Sir, we will take that back, and if we can do it we will submit it for the record.

Senator LEVIN. Thank you.

Senator EXON. Let me interrupt. If you cannot get it, I have a copy of it.

Senator LEVIN. Well then, maybe you could ask Senator Exon. He might be able to give you a copy. [Laughter.]

Dr. COOPER. Senator, it is just not our letter. I do not see any reason. We probably can provide that, but I will go back and check for you.

Senator LEVIN. Thank you.

[The information follows:]

LETTER FROM GOVERNORS

WYOMING EXECUTIVE DEPARTMENT,
Cheyenne, WY, February 10, 1984.

Hon. RONALD REAGAN,
The White House,
Washington, D.C.

DEAR MR. PRESIDENT: We urge you to postpone deployment of the MX missile in Nebraska and Wyoming for one (1) year. Now that America is back and standing tall, a unilateral offer to postpone deployment of the missile for one year may be read as a clear signal by the Soviet Union that our countries should jointly strive to keep the peace in a more settled world.

Surely our strength can be maintained for twelve (12) months while we are awaiting a response to your gesture. Certainly the federal budget could use the $15 billion if the Soviet leadership reacts postively. Even if they do not respond, the $5 billion of postponed costs will be helpful toward balancing the budget. Because of its vulnerability, the MX could turn out to be a sitting duck in a sea of deficits.

At the state and local level, we can wisely use the extra time to analyze the final enviornmental impact statement and to secure money for impact mitigation.

We urge you to strike a dual blow for world peace and reduced federal spending.

Respectfully,

BOB KERREY,
Governor of Nebraska.
ED HERSCHLER,
Governor of Wyoming.

RUSSIAN ICBM'S

Senator LEVIN. The Soviets are developing a number of improved versions of their SS–18's and 19's, their best ICBM's as well as a new 10 warhead ICBM called the SSX–24. Can you tell us whether or not these modifications that they are testing in the SS–18's and 19's are likely to give them greater military capability in terms of reliability or accuracy?

General FORNELL. Sir, I believe that it does constitute an improvement in their capability. They have demonstrated a continual improvement in their capability.

Senator LEVIN. Do we have any concern about that?

General FORNELL. Yes, sir.

Senator LEVIN. How about the SSX–24, their new 10-warhead solid fuel missile? Are we concerned about any additional military capability that that gives the Soviets?

General FORNELL. Yes, sir.

Senator LEVIN. The 1985 budget continues dismantling the Titan II missiles, as I understand it. And Senator Exon and I have gone through this over the years, but are they still being retired at a rate of eight or nine a year?

General FORNELL. Yes, sir.

Senator LEVIN. Is it not true that we are not making the savings that we thought we would make from dismantling those Titan II's?

General RUSS. We are—or we are not? I'm not sure of the question?

Senator LEVIN. Is it not true that the initial estimate of cost savings from the dismantlement was high, higher than it proved in fact?

General RUSS. Sir, I do not know what was the cost estimate. I will have to look that up.

[The information follows:]

SAVINGS ON DISMANTLING TITAN II

In 1981 the Air Force projected cost savings of about $450 million for Titan II deactivation. Since the initial costing, pay raises and other entitlement changes such as retired pay accrual have caused increases in the average cost of military personnel. As a result, savings associated with Titan II deactivation and the associated manpower reductions are actually greater than originally projected. Our current estimate is that the deactivation program will save about $458 million. These savings are already reflected in our current budget and FYDP.

TITAN II'S

Senator **LEVIN**. Do you know what it would cost this year not to dismantle the Titan II's? What we would have to add back for those eight or nine that we would not dismantle this year?

Dr. **COOPER**. Senator, I do not have the precise numbers, but again that we can supply to you.

[The information follows:]

SAVINGS NOT TO DISMANTLE TITAN II'S

Stopping the Titan II deactivation program for fiscal year 1985 would require approximately $4.5 million and appropriate military end strength to restore the manpower associated with the nine missiles planned for retirment. If the deactivation program were to be further delayed, additional funds as well as end strength would be required in subsequent years. For example, keeping the two remaining Titan wings operational through 1989 would require an additional $203 million above what is currently programmed.

Senator **LEVIN**. Mr. Secretary, you do not know whether or not it is true that we are actually giving up one-third of our ICBM megatonnage while saving less than one-half of what was originally claimed?

Dr. **COOPER**. Senator, we are giving up a great deal of our ICBM megatonnage, that is a fact. As far as what the cost savings is, I just do not have that number off the top of my head.

Senator **LEVIN**. Could you provide that for the record? What are the savings we have actually achieved and what are the costs of the dismantling process, which we understand has reduced the level of those savings?

Dr. **COOPER**. Yes sir.

[The information follows:]

SAVINGS AND COSTS OF DISMANTLING PROCESS

In 1981 the Air Force projected cost savings of about $450 million for Titan II deactivation. Since the initial costing, pay raises and other entitlement changes such as retired pay accrual have caused increases in the average cost of military personnel. As a result, savings associated with Titan II deactivation and the associated manpower reductions are actually greater than originally projected. Our current estimate is that the deactivation program will save about $458 million. These savings are already reflected in our current budget and FYDP.

The Air Force's costs of dismantling the deactivated silos were not considered in our savings estimates. Silo dismantlement is a separate program, recommended by the Joint Chiefs of Staff and approved by the Secretary of Defense in support of the President's policy not to undercut existing arms control agreements. The SALT I Interim Agreement allows the United State to increase submarine launched ballistic missiles from 656 to 710 if Titan II launchers are dismantled. Thus, the U.S. can continue to deploy the Trident submarine without having to dismantle as many Polaris submarines as would otherwise be required. Our current cost estimate for dismantling the deactivated silos is approximately $35 million. These costs are spread over a three-year period, beginning in fiscal year 1984.

Senator **LEVIN**. May I have 1 more minute?

Senator **Warner**. Senator, take whatever time you need.

Senator **Levin**. Thank you, but I do not want to intrude on Senator Exon's time.

The small missile, the small ICBM, which we presumably gave a high priority to in 1983, apparently it is going to take us 10 years to have the IOC of that high priority weapon. Is this program funding-constrained or is it technology-constrained, that it takes us 10 years? It took us less time to get to the Moon.

Dr. **Cooper**. No, sir. Just to give you a basis for comparison, it will take us 14 years to field the Peacekeeper.

Senator **Levin**. But that is because the Congress was opposed to it and a few other people.

Dr. **Cooper**. Well, we have maintained the technology on the Peacekeeper. My numbers are it will take us approximately 9 years to field the small missile, to reach an IOC.

I can assure you that we are moving at about the fastest pace possible right now. I do not think it is funding-constrained. It is not funding-constrained to my knowledge. It may be somewhat technology-constrained in terms of the hard mobile launcher. But I believe we are moving as fast as we can at this point.

Senator **Levin**. So there are no funding constraints. If we added money to that small missile, it could not speed it up?

Dr. **Cooper**. Not to my knowledge.

General Fornell, do you have a comment?

General **Fornell**. In fact, Senator Levin, that is why we used General Schriever's advisory committee to give us an approval on a concept that said our acquisition strategy was usable and doable.

Senator **Levin**. I have just one last question for the record, Mr. Chairman.

How can we be sure of the verification of the small mobile ICBM? If the Soviets adopted our concept, how could we verify their numbers? Have we thought about that problem?

General **Fornell**. Yes, sir, we have thought about it. In each of the concept development contracts that we have let at the very front end here, there is a clause in each of those contracts that has them address verification problems. As you know, there are a number of opportunities to observe from the very inception of piece part manufacture to the actual deployment site and there are a number of ways that it could be verified, either during manufacture, production, construction deployment, or operation.

Senator **Levin**. Even if the Soviets had done the same thing?

General **Fornell**. Yes.

Senator **Levin**. Thank you.

General **Shaud**. Senator Levin, I might add with regard to the verification, of course it is a most difficult task, but with the single RV missile that reduces the verification problems.

Senator **Levin**. It does indeed. And thank you.

Mr. Chairman, I do have some questions for the record that I would like to submit.

Senator **Warner**. Well, I am not sure now. The question you just asked is very important and I want to make certain that our response is complete. You said, even through the Soviets "are doing the same thing." The subcommittee had extensive classified briefing this week on exactly what the Soviets are doing in the way of mobility, and without in any way declassifying that testimony, there was a wide range of things. There are options open to both nations in terms of mobility.

So I am not sure what you meant by doing the same thing. We saw here basically four options of mobility with the small missile, did we not, gentlemen?

General **Fornell**. Yes, sir. Those were four separate concepts devoted to hard mobile launcher alone. There are other mobile concepts that we have data on, and we do not need to put together a whole program in order to validate the concepts.

Senator **Warner**. I mean, of course, that we have conceptually road-mobile using existing infrastruture highways, we have rail-mobile using existing infrastructure. But we have before us today the four that are not out on contract. As I understood it, and I do not know if the Senator was here at that time, the concept for the deployment at the moment of our small Midgetman is within DOD property, on a special road system that presumably would be constructed for the exclusive use, thereby excluding or minimizing interface with the civilian system of roads.

Senator **Levin**. I understood their answer to be that if the Soviets produced a system similar to the one that we are now designing, that we would not have verification problems because we are requiring the designers of this system to give us a system which meets and satisfies verification requirements.

Is that not a summation of the answer I heard?

Senator **Warner**. I do not believe that was the answer that I understood. I would be happy for a clarification.

General **Fornell**. I did not intend that. Verification, as General Shaud indicated, is a problem, but we are addressing it in a questioning sense here at the front end of the program.

I think you are striving for another point and I am not catching it, Senator.

Senator **Warner**. That is why I raised it.

Senator **Levin**. Well, I am not striving for any point. I am just wondering whether or not we are producing a system which, if the Soviets duplicate it, will create verification problems. I thought the answer was that we are requiring the contractors to design the system in such a way that we can satisfy verification needs if the Soviets produced a similar system.

That is what I thought you said. I am not trying to put words into your mouth.

General **Fornell**. We are having them examine the concept of the types and modes that we would use in verification for a mobile system. It is a difficult question, sir.

Senator **Levin**. Thank you.

Senator **Warner**. If I understand the answer, it is that as a part of the study contracts the contractors are advising the Department of Defense on the problems of verification.

General **Fornell**. Yes.

Senator **Warner**. Which is distinct from saying that, here is the solution. Maybe they are offering solutions, but they are outlining the whole spectrum of problems associated with this concept of a mobile system now being studied for Midgetman.

General **Fornell**. Yes, sir.

Senator LEVIN. In other words, they may or may not solve the problems.

Mr. COOPER. Senator, I guess my view on that is we will be able to design a system that will be in compliance with any arms control agreement that we reach. I am confident of that. I am sure we can take the necessary steps to make the small missile in its mobile form verifiable.

As you well know, we do not control the Soviet design bureaus, and that will be up to the Soviets as to what steps they would take. Certainly, if they followed the same design pattern that we have here, it would be verifiable. That does not detract from your question. Verification has always been an issue as far as arms control is concerned.

Senator LEVIN. You say certainly, if they followed the same design that we showed here, it will be verifiable. And both the Chairman and I at that point have to look at you and say, "How do you know that?"

Mr. COOPER. My statement, Senator, was that I am confident that we will be able to design a system that will be verifiable and that will be in compliance with any arms control agreement that we might meet.

Senator WARNER. What a statement! No. 1, we do not know what the arms control agreement would be. And No. 2, you are confident that we can design a system. But I do not know at this juncture whether it is the intention of the Department of Defense to so design a system that would be verifiable.

Dr. COOPER. Of course, Mr. Chairman, that would be handed to us from whatever the arms control agreement was. My only statement is, I am confident that we have the technology and design expertise to design a system that will be verifiable in terms of how we assemble it, the checkpoints——

Senator WARNER. Well, I think I will need further clarification.

Senator LEVIN. And I have taken up too much of Senator Exon's time already.

Senator WARNER. Why do you not go ahead, Senator Exon.

Senator EXON. Thank you, Mr. Chairman.

Now, let us return to that. Maybe you would want to go into that in closed session, Dr. Cooper. But I suppose we can design any kind of system with a Christmas tree on it. Is that what you are talking about?

Dr. COOPER. No. But, Senator Exon, in terms of, for instance, the submarines, that system is verifiable in terms of the number of platforms we have, how the missiles are taken on and off. My only statement is I cannot tell you what the precise design is.

My confidence is in that we can design a system that is verifiable. It may be slightly more expensive, it may be slightly more complicated but if that is our desire I am confident we can design such a system.

DETERRENCE

Senator EXON. General, you were talking about deterrence in reply to a question from Senator Levin. That was a little bit curious. At least it was curious to me, and I want you to amplify on it a little bit more, since I am sure you are an expert in strategic planning.

You were discussing with Senator Levin the deterrent feature of the MX missile. If I tuned in correctly, Senator Levin was inquiring whether MX would be a deterrent. Then you got into a discussion of the three legs of the triad and you said something to the effect that, well, it would depend upon what kind of attack was launched.

I believe you said, for example, if they would launch their attack on our air fields, then the MX would be a deterrent. Is that what you said?

General SHAUD. Sir, with regard to the question of survivability and the SLBM, with its degree of accuracy—and I had probably better go into closed session on this. But just to speak in general nature, with the SLBM's accuracies it would probably target airfields as opposed to our silos.

In that event, we would have sure knowledge that we were under attack. The President would determine a retaliation, and with that particular scenario then our ICBM fields would be able to respond with a prelaunch survivability of practically one.

SOVIET FIRST STRIKE WARNING

Senator EXON. Well, I am glad that you clarified that, because that just complicates the whole planning process, as I understand it. Put yourself in the position of a military planner in Moscow. Could you possibly conceive any kind of first strike, which this would be, against us that would give us warning by striking the air fields and leaving the MX's alone? Should we not assume that MX would be the most worrisome thing to the Soviet planner?

Can you imagine a Soviet planner doing that, tipping off what they have in mind and allowing us to launch the MX's?

General SHAUD. No, sir. And of course, as you well know, that is the whole nature of the triad. That is, to complicate the Soviet planner's problem, so that he is never able to go to his chief and say, yes, a first-strike attack would work.

The other side of the coin is, as he would launch ICBM's we have about 30 minutes warning of such an attack, and in that event we can use, say, the bombers with the positive control launch. The whole nature of the triad is to make it so complicated for a Soviet planner that he could not successfully carry out an attack, which is the essence of deterrence, if you will, or at least to create the uncertainty in his mind.

Senator EXON. Well, if the Soviet Union were going to launch a first strike, I would anticipate that they would time their attacks on certainly the MX's in Minuteman silos. I would think that they would not want one second difference between when the blast went off, and a simultaneous attack on our air fields to keep our bombers from getting off the ground.

But we certainly are not anticipating that the Soviets would be good enough to give us 10 or 15 minutes warning by SLBM attacks on our runways, and then decide later whether they wanted to attack the MX or not, are we? That cannot be a part of our planning, can it?

General **Shaud**. The third case is a simultaneous arrival. In that case, where he has to time his attack to take on both the missile fields and the air fields, we have delta in time between our sensing of his missile launch and the arrival time of the SLBM launch, which gets down to about the 15 minutes to save our bomber force. That would be in the third case, sir, as you say.

Senator **Exon**. Can you imagine a scenario where they would not strike first at the MX?

General **Shaud**. Well, the point is, if they strike first at the MX we are able to save our bomber force. That is what is discouraging him from a first strike at the MX.

TITAN II'S

Senator **Exon**. I have a question about the Titans. Now, you have touched on them, I guess, briefly. Maybe you have not. I have heard some people say that the decision to deactivate the Titans was based solely on the cost considerations and others say it was related to arms control.

Can you definitively answer this for me and tell me what the status deactivation of the Titans is right now? The last I heard we were down to 39. Are we beyond that now?

General **Russ**. Senator Exon, let me address the latter part of the question, if I may, and then General Shaud can answer the first part of it.

As you know, we have three wings of Titan missiles, approximately 18 missiles per wing. We started deactivation in Davis Monthan and currently have deactivated 15 of those missiles, so there are 3 left.

Senator **Exon**. What area is that?

General **Russ**. We deactivate at a rate of about one every 30 to 45 days.

Senator **Exon**. So you have taken 15 of 18 out?

General **Russ**. Yes, in Davis Monthan Air Force Base in Tucson, AZ.

And after we finish these 18 by midyear, we will start on the second base and that will take approximately 2 years. Then we will go to the third base.

General **Shaud**. Sir, there are at least three interrelated reasons. The first one, is the cost of the operating and maintaining an aging system.

A second aspect that we would pay attention to would be with regard to arms control, where in fact the Titan II's would provide certain head room then for SLBM's.

The third part of the question as we review the Titan II's is our notion of targeting, and perhaps I better go into that in closed session.

But those are the three interrelated reasons, sir, and I think they were in sequence, and everybody that talked to you about it probably told you fact, but in fact all those three reasons were operable.

Senator **Exon**. Let me back up a minute. We originally had 52 Titans, did we not, 3 years ago?

Dr. COOPER. Originally, Senator, I believe we had 54, and I believe it was 3 years ago that we were down to 52.

Senator EXON. So what do you do, subtract 15 from that and that is what we have left?

General RUSS. Yes, sir.

Senator EXON. Can you amplify in open session a little bit more, General, about the arms control part? Let me tell you why I am asking these questions.

I suspect that when we come to budget considerations, both in the Budget Committee, who will place some restraints on the figures sent in the President's budget, and this committee and the full Armed Services Committee are going to have to make some hard choices. I guess what I am saying is, if we decide, right, wrong, or indifferent—and I understand you are opposed to it—if we decide to extend, not to cancel but to extend out the MX program and only buy 10 or 15 this year instead of the 40, then that is going to put down the road a ways the date when we would make these fully operational.

If we should decide to do that, then would you think it would be good from a deterrent standpoint for us also to slow down the staging out of the Titans or not?

Dr. COOPER. Senator Exon, I guess from a deterrence point of view we believe the best thing to do is to go forward with the MX program.

Senator EXON. Well, I understand. Given that.

Dr. COOPER. I am not prepared to answer that. It is a hypothetical and you would have to stretch it out. I guess we could take that back and look at it, but I just do not have a position to bring to you if the program is stretched out.

Senator EXON. I wish you would get that to us for the record so that we will have that option. I am wondering if we have a cost on that. At least, you might take it and supply that for the record, in either closed or open session, as to whether you think—or how effective you think that might be.

[The information follows:]

STRETCH OUT OF MX PROGRAM

One way to strech out the Peacekeeper program would be to procure 21 missiles per year and deploy 10 missiles each year until 100 are deployed. The 11 missiles per year not used for deployment would be for the operational testing program. Using this profile, $673 million could be reduced from fiscal year 1985. However, the production program would be extended by five years and the overall program would increase by the almost $5 billion. The full operational capability would be achieved in 1996 compared to 1989 under the President's program. Production efficiency would be marginal—1.75 missiles per month when the optimum is 4 per month.

Senator EXON. I guess what we are doing here is looking for options.

Dr. COOPER. I understand.

Senator EXON. Although the Scowcroft Commission I think basically scrapped and threw out the window, the window of vulnerability, I think some of us still feel that maybe we should not be unilaterally disarming ahead of schedule, because I understood that the MX was to take the place of the Titans, and it appears to me that we are phasing those out at such a rapid rate that I am convinced that there are not going to be MX's in place to take the place of the Titans as we phase them out.

I just wonder how much of a concern that is or is not for you people who have some responsibilities in this area.

Dr. COOPER. Senator, might I just add that the thing that I am having trouble with on the hypothetical, quite frankly, is if you are talking about stretching the MX program and it is simply a 1-year stretch where you are cutting back from 40 to 30 missiles, would we then be willing to extend Titan a year? That is one hypothetical.

Another hypothetical is if you are going to stretch MX for the next 5 years. That is another one. I am having trouble with the particular hypothetical that you are posing, but I just have not gone through all of that. That is why I am unable to answer right now.

Senator EXON. I see. Well, as long as you can do some work on it, Dr. Cooper. I guess maybe you ought to start by saying that we do not want to buy any MX's in the next budget year, so what do we do with Titan? Then if we bought 10, then 20 and so on. And I expect above 20 that it does not make too much difference than if you buy 30.

Dr. COOPER. Or are there any circumstances under which we would say, not phase out Titan? Maybe that is another way to put it.

Senator EXON. Well, I am not against phasing out Titans if you think we do not need them. But I have not been able to figure out why we have accelerated the taking out of the Titans when we have nothing to put in their place.

I am convinced—and I keep asking this question of every group that comes before us—I am convinced that it is not a matter of conforming with arms control limitations, or is it?

Dr. COOPER. Well, we are putting something back in the place of Titans in addition to the MX, and those are the SLBM launchers. We will be putting 54 SLBM launchers in place once the silos are completely dismantled and destroyed. So we are putting something in the place of the Titans, and we are trying to stay within the total SALT limits.

But when you completely tear down the Titans and deactivate and destroy the silos, then we are able to come back up in another area. And right now we are talking about the SLBM force.

Senator EXON. Are you telling me, Dr. Cooper, that you believe the SLBM force will be on line and therefore we have to take Titans out? You certainly are not telling me that we have to take these 15 Titans out already to come within the SALT II, are you?

Dr. COOPER. No, sir. But if we want to add additional SLBM's, we then have to deactivate the silos. We have not done that yet. There will be a gap, but ultimately we will put something in their place. That is, unless we have a future arms control agreement that precludes us from doing that.

SUPERHARDENING OF SILOS

Senator EXON. Let me see if you can answer this next question in open session. You must be doing quite a lot of work on studies of superhardening of silos, both from the standpoint of the MX and from the standpoint of the Midgetman.

Dr. COOPER. Yes, we are. That is the third phase of our ICBM modernization program.

Senator EXON. I assume that if we so chose it would be cheaper and easier and we could accomplish it more quickly from the standpoint of hardening. I suppose it would be easier to harden a silo for a Midgetman than it would be for an MX?

Dr. COOPER. I will let General Fornell answer that, or General Russ.

General RUSS. The same technology goes into it, sir. The fact that a Midgetman is in a smaller hole means it would be less costly to do a Midgetman than it would be to do a Peacekeeper missile.

Senator EXON. Can you tell us how far you are along on that program, or is that a matter for closed session?

Dr. COOPER. No, sir. General Fornell can address that.

General FORNELL. Sir, we have a joint program with the Air Force and the Defense Nuclear Agency which is doing a number of scale tests leading eventually to a full-scale, probably, of small-missile-sized silo in 1986. That work is a continuation of work that was done previously even before closely spaced basing came onto the scene. That work continues out at several test sites, and we now have reasonable confidence to believe that we are attaining levels of hardness at 20 to 25 times that of our current missile silo technology.

We have found that the constrained structure of steel rebar and concrete structure is capable of withstanding pressures that we normally talk in terms of 25,000 psi and above because of its resilient nature.

The other significant factor is, going back and looking at old test data from our Pacific nuclear tests and transferring that to different geology, such as in loose, dry soil, and the difference in the cratering size has led to a new cratering computations which, based on the additional hardness you are capable of attaining, combined with the smaller crater size, of surviving nuclear air blast effects much closer to the crater.

Senator EXON. Thank you.

Thank you, Mr. Chairman.

Senator WARNER. Senator Exon, you had the opportunity to question the witnesses with reference to the verification issue that was raised. I think you have to go back and restudy the record that you made today and reflect on that issue. I would not want to leave the impression that this small mobile system is designed toward any specific goal with reference to verification.

Dr. COOPER. No, sir, I did not say that that was the case.

Senator WARNER. And I was not suggesting that. My understanding is that you are examining the system as envisioned today and what the possible problems would be under verification.

As we know, the parameters——

Dr. COOPER. As we know them to be today, yes, sir.

Senator WARNER. And also as we can project, as best we can, what arms control negotiators are likely to achieve at future sessions.

Dr. COOPER. Senator, I guess the sense of my statement—and perhaps I can clarify it—was I think it is difficult for us to speak for the Soviets and what they might do in the way of designing in verification measures. The sense of my statement was I am confident that if we were to reach an arms control agreement and there was a verification provision in it, that we could make the small missile verifiable.

It might impact the design, it might make it more expensive, but I am confident that technically, if we had the will to do it—and I think we would have the will to do it—that that could be done. I do not see any show-stoppers there. We do it with the SLBM force.

I am sure you will recall in the multiple protective basing mode, where we have many silos and a few missiles, we designed a system there in terms of a series of pens—p-e-n-s, pens—where the missile had to go through and that the Soviets could use their national technical means of verification to pick it up.

I am confident that we could do that as well with the small missile. It is difficult to go into much more detail without knowing, you know, what the exact arms control conditions are.

Senator. WARNER. Well, I think you should review the record and make the appropriate entries to clarify matters.

Are there any further questions?

[No response.]

There being no further questions, it is the Chair's intention to go into closed session. We will take a 5-minute recess, during which time I ask that the room be cleared, and we will regroup for purposes of a closed session.

[Whereupon, at 3:59 p.m., the subcommittee recessed, to reconvene in closed session.]

EXECUTIVE SESSION

The subcommittee met in exectutive session, pursuant to recess, at 4:05 p.m. in room SR-222, Russell Senate Office Building, Hon. John W. Warner (chairman) presiding.

Present: Senators Warner and Exon.

Staff present: Robert F. Bott and William E. Hoehn, Jr., professional staff members; Brenda K. Hudson, assistant chief clerk; Douglas R. Graham, research assistant; and Karen A. Love, staff assistant.

Also present: Gerald J. Smith, assistant to Senator Goldwater; Les Brownlee, assistant to Senator Warner; Bernard R. Toon, assistant to Senator Quayle; Jeffrey B. Subko, assistant to Senator Exon; and Peter D. Lennon, assistant to Senator Levin.

Senator WARNER. Secretary Cooper, Generals, we will resume in closed session. Do you have any direct presentation that you wish to make before we proceed to our questioning?

ACCURACY OF PEACEKEEPER FLIGHT TESTS

Dr. COOPER. No, sir. But there was a question asked in the open session and I would like to have General Russ address it. It concerns the accuracy we have achieved to date in our Peacekeeper flight tests.

Senator WARNER. I think Senator Cohen asked about that.

Dr. **Cooper**. About the small missile, we claim that it is roughly the same, our goal is roughly the same, as with the Peacekeeper.

Senator Exon, just for your benefit, we have had three flight tests that were very successful, and the data comes from those flight tests.

General **Russ**. Let me first orient you to this slide.

[Slide deleted.]

You might notice the background in this shot here from [deleted] feet.

The first shot is indicated in yellow.

Senator **Warner**. Is this Peacekeeper?

General **Russ**. It is Peacekeeper. We call this the overall——

Dr. **Cooper**. Maybe we should use the Kremlin, Mr. Chairman. That might be better.

Senator **Exon**. That is much more accurate than the Peacekeeper ever was in its original.

General **Russ**. The accuracy requirement is [deleted] feet. That is the same accuracy requirement as we are putting on the small missile, and we have on the Peacekeeper the AIRS guidance system, and we plan on putting, at least baselining, on the small missile the lightweight AIRS system. So we are looking at the same sort of accuracy.

Really, what it says is here, indicated by these yellow triangles where the six warheads are indicated or the average of those was [deleted] feet on the first shot. For the second shot, the average was a little over [deleted] feet. On the third shot, the average was a little under [deleted] feet.

So far we are very favorably impressed with the first three shots.

I might mention that [deleted] .

But that does not make me feel any more comfortable.

Mr. **Graham**. Would you go into a little detail about the difficulty you have had on the third flight test.

Dr. **Cooper**. Let me speak to that in general and then General Fornell can go into detail.

As you know, the Peacekeeper is a three-stage-solid rocket. The problem we had on the third test, which was on December 20—in fact, I happened to be there to see it. I did not see the problem. It occurred on the third stage and, as General Fornell pointed out in his briefing, there is something we call an extendable nozzle exit cone.

Basically what this does is it gives you additional range on those stages. When that extended, we had a failure and the cone, I guess, separated is our best estimate right now. As a result, we were not able to attain the full range out of the third stage that we normally would obtain. In essence, it ran out of gas before it got where it was supposed to be going.

As a result of that, when the fourth stage, which is the final stage, the liquid stage, had to try to make up for that range deficit, and it quite—well, General Fornell, I guess we just ran out of gas before we got there.

That is a very general explanation as to what happened. General Fornell can fill you in with the details.

[Slide deleted.]

General **Fornell**. Mr. Chairman, this is our third stage. This is built by Hercules, and of course Dr. Cooper was at the launch, and all of the contractors are lined up in a row here, and of course when we have any difficulty at all they all run from office to office: It was yours, it was yours, it was yours.

But it turned out it was our third stage. We can vividly describe what happened here. This is under an altitude test where the rocket motor is actually fired. You see the intense heat and it transfers right through the surface of the cone itself.

What we have on the nozzle, there is a hydraulic mechanism like a Boy Scout drinking cup that you expand. It is a three-phase version on the stage three. This is the hydraulic actuator.

To protect the hydraulic actuator from this intense heat on those rods, we have a heat-resistant shield that protects the actuator. What happened was a weld on one of those actuators failed because of a quality control inspection on the weld itself. That failed, causing this upper cone to fall off, thereby not attaining the full performance of stage three.

As Dr. Cooper indicated, when it cut off, stage four came on and tried to make up the difference, and got through the deployment of the first four warheads which I showed you. My movie showed you the actual reentry vehicles of flight No. 3 and you could see all eight coming down, so they did not disperse all over the Pacific Ocean. They are in the scoreable range.

But we know exactly what happened from our data. The other four then just did not meet the velocity gains that are required to release the reentry vehicles from the bus, and all four sort of remained on the same trajectory after the failure occurred.

But we have a fix on the welds on the actuators themselves, and I feel we have a good handle on the problem.

For the information, now that we are in closed session, our next flight is scheduled for March 30. That is a Friday. We have extended numerous invitations to congressional members if they care to come out to Vandenberg and witness one of these.

We will be going to a 10 reentry vehicle launch on the 30th. Those arrangements will be made and certainly we can accommodate any interest that you all might have regarding our launch. We will be launching about four for fiscal year 1984, sir.

Senator **Warner**. If you had to plot the completed system, where are you on that curve? You are testing a vehicle now. That is what percentage of the completed system?

General **Fornell**. We are now about 30 percent complete of the total program, sir. We are over 50 percent complete in the RDT&E world and we are slightly less than 30, of course, we are twenty-one one-hundredths, into deployment as it is in the procurement side.

The pace of the research and development account—this is our peak year, and in fact we start down. This is the peak year in procurement for 1985 and it starts down, so that the real hump in the very quick buyout program in our deployment schedule in the area matches the bringing down of those Minuteman III's and deployment of the Peacekeeper missiles in those silos.

Dr. **Cooper**. General Fornell, it is what, a 20-missile test program?

General **Fornell**. Yes, sir.

Dr. **Cooper**. This is in terms of the number of tests we have, Mr. Chairman. Of course, we have completed three. You might want to expand on that just slightly.

Senator **Warner**. Well, take for example the missile itself, just the missile. You are testing vehicles now that represent what percentage of the final missile?

General **Fornell**. Well, I would say in the high 80's or 90 percent right now.

Senator **Warner**. So we can derive considerable confidence from three good tests on a missile which is 90 percent complete, is that right?

General **Russ**. Yes, sir. This missile, if it tests properly, will replicate the production missile.

Senator **Warner**. When you say "this missile," do you mean No. 4?

General **Russ**. Yes, sir, the one we are sending up. It will not be exactly like the production missile because we find little things that are wrong as we go through the tests. But the fewer things we find wrong, the more the missile will be exactly like a production missile.

So far, we have been very, very excited about the first three tests, other than that one problem.

Senator **Warner**. Why would you need 16 more, or was it 19 or 20 tests?

General **Fornell**. We have 20 flight tests scheduled for the whole program.

Senator **Warner**. Why would you need such intensive testing?

General **Fornell**. Sir, in comparison to other programs that is a very small number.

Senator **Warner**. It is?

General **Fornell**. Yes, sir. I have a comparison of other programs.

[Additional information follows:]

20 MISSILE TEST PROGRAM

There are two elements to the Peacekeeper test program: the R&D test and evaluation program and the operational test and evaluation program [OT&E]. The former involves 20 development missiles, the latter requires 108 operational missiles. The 20 development flight tests are required to validate system performance prior to deployment and obtain a reasonable statistical sample to demonstrate that the system meets its design specifications and operational requirements. Each flight test has specific objectives to fulfill, and 20 flights are needed to demonstrate these objectives. The number compares favorably with other programs: Trident required 43 R&D test flights, Pershing 40. For OT&E over the system life, 108 missiles are required. These test assets are needed to ensure system reliability is being maintained and to provide the data required to support development of required JCS planning factors. This number also compares favorably with other programs: Trident requires 334 and Pershing 120.

Senator **Warner**. Now, you are in the business and I am just sitting here trying to make some judgments. But if you were testing a missile, No. 4, which represents 90 percent of the total missile itself, and you have a good successful test, are you still of the opinion that you have to have 16 more tests?

General **Russ**. Well, sir, the statistician will tell you that that is not a big sample. That is what they tell us about the first three. You know, you may have a major problem in the missile somewhere and it does not show up until the fifth, sixth, seventh, or eighth flight. So you need to do a representative sample. You know, how many I do not know. But we have probably been more successful with this missile than we have with any other missile before, and it is very encouraging.

General **Fornell**. Sir, this is of course a very pristine environment to begin with and very carefully controlled test conditions. As the focus of the program shifts to a more operational nature, we tend to treat it like a real SAC silo missile launch.

We have operational crews do it. Right now we have highly skilled contractor technicians.

Senator **Warner**. Sir, your point is a valid one.

Dr. **Cooper**. General Fornell, correct me if I am wrong on this. But Mr. Chairman, I think it is more than just the missile that we ultimately test as well.

General **Fornell**. Yes, sir.

Dr. **Cooper**. In terms of the silo, these are out of a canister at present, above ground. I think it is about half the tests that will actually be run below ground.

General **Fornell**. It is 12, sir.

Dr. **Cooper**. Mr. Chairman, I was just saying that, in addition to the missile, as was pointed out, we also have to refurbish, if you will, the Minuteman silo, all the command and control that goes along with that. That also forms a subsequent part of the test program, to test the complete system.

Senator **Warner**. Well, I guess I was trying to express some pleasure with the success that you have had thus far, and then ask some question as to why we needed so much testing. But I do understand it.

Now, in the area of hardness, is there anything classified that we should know? The question has been put to the Secretary about the survivability, and I think those questions were inconclusive the way they went. I am not saying that by way of criticism, but whether it is 5 percent or 30 percent is important.

But then I reflected on your open testimony about extraordinary gains you are making in the R&D in hardness. I was trying to extrapolate from that survivability. Would that not up the survivability?

General **Fornell**. Yes, sir. And, of course, the whole intent in the Scowcroft Commission recommendations on our continuing basing technology focuses on the long-term survivability of the land-based leg of the triad. That is in the recommendation.

That is in your direction through the authorization cycle last year to us to examine these promising technologies that have a potential either in the small missile or in Peacekeeper basing.

There is a part that I did not talk to in enough detail. That is that we have tested the current configurations of scale model silos to [deleted] psi. When we normally talk about missile silos, we normally talk in terms of a Minuteman silo at about 2,000 psi. But now we are attaining levels, as I say, 20 to 25 times that.

We will retest that identical silo which survived [deleted] psi to [deleted] psi. One of the real challenges in that world is holding the instrumentation together to measure those kinds of effects.

We recently have conducted a test where the instrumentation amazingly survived. [Deleted.] I even have a picture, Senator, of that if you want to see it.

What I am saying, sir, is we are attaining and are on the kind of threshold of technology that is now available to the industry and to the academic community which was not there less than 2 years ago, as we set out with closely spaced basing, of course, which was very dependent on the hardness of those individual silos.

Dr. COOPER. One of the key issues, Mr. Chairman, I think in the long term will be the costs that we have to pay to attain the hardness that we are looking at right now. Certainly, if we can attain these hardnesses and they are affordable, we will gain survivability in an absolute sense.

But I think there is also a psychological element here as well with the Soviets. In my view, the name of the game is deterrence, and to inject as much uncertainty in a Soviet planner's mind as possible, and that is one of the big benefits if we can attain these hardness levels, to keep that uncertainty high, and as a result of that hopefully we will all keep the deterrence high.

Senator WARNER. Senator Exon, I was just generalizing here. Do you have any questions that you want to add?

Senator EXON. No, go ahead, Mr. Chairman. I may have one or two later.

MIDGETMAN

Senator WARNER. On the mobile system, the Midgetman—and I have not gone back to reread the Scowcroft report. Did the Scowcroft report restrict that to a DOD installation, or were you given the option?

It is my recollection that you were given a fairly free hand to determine the parameters of mobility.

Dr. COOPER. Mr. Chairman, again what will determine the land requirements is the hardness level that we can attain and the weight of the system. I think ideally from our point of view, we hope to be able to develop a system that will be hard enough to keep on DOD land. It is not my recollection either—and I will ask General Fornell—that we were necessarily restricted to DOD land.

I think we run into great problems if we get off of Federal land and start roaming around the freeways with this thing. Public opinion will be extreme.

Senator WARNER. But there could be a point in the history of United States-Soviet relationships where the public might be 100 percent behind anything we can do to defend ourselves, and accept this risk, minimal though it may be. It is almost an irrelevance, if that little missile is what saves them.

I quickly glean from your presentation that this design is such that it would not interface with the existing highway system, if at some point we determined that we wanted to do that?

Dr. COOPER. I do not think we necessarily said that, Mr. Chairman. We said it was our desire, if we are going to be able to develop a system that would satisfy all of our needs while staying on DOD lands—a point that needs to be made is that certainly in a wartime situation, or if we reached crisis proportions, for some reason we might want to put it out on public highways.

Senator WARNER. "Breakout" is the term that is used.

Dr. COOPER. Yes, breakout, if you will.

But the point we need to make is, in order for this system to be effective it also has to be mobile during peacetime conditions, so that we can preserve location uncertainty, very much like the SLBM force.

Senator WARNER. Well, that leads me to this precise question: Will your design parameters come up with a vehicle which, by virtue of its size, be precluded from using the highway system?

Dr. COOPER. That is the key. That is why there was a weight limitation, I believe, placed by the Congress last year on the missile, the 33,000-pound maximum, because you pay for every pound of missile. There is roughly a 3- to 4-pound—what is it?

General FORNELL. Thirty to the missile and ninety to transporter.

Dr. COOPER. Yes, there is a great additive weight to the other parts of the system. When you get much beyond 30,000 pounds, you start to get into a system that will not be compatible with the roadways; it will be too heavy.

Senator WARNER. That is my point. They just could not be transported.

Dr. COOPER. Right.

Senator WARNER. So using the 30 as a cap, then designing a vehicle within some reasonable psi, it could use the Interstate Highway System?

Dr. COOPER. Yes, sir, it is conceivable.

General RUSS. Sir, there is a knee in the curve there on how much you have to pay for hardness, how much weight do you have to add for it, and how you do that. We need to understand that better than we do now, and that is why we are looking at that with some of these contractors.

The harder it gets, the less land you have to have. But if you have to get it too hard and it weighs too much, well, then you cannot drive it around on the various roads you want to use. So there is some sort of balance between there that we have to figure out.

Senator WARNER. Well, for the moment I represent that my position would be that the vehicle has to interface with the existing Interstate System, which leads to a horrendous verification problem, if not an impossible one. What we learned in our classified briefing the other day relative to the Soviet program is that they are going ahead with several systems, which I am sure you are equally or more familiar with than I, that just do not lend themselves to any verification, other than whatever might be gleaned from overhead photography.

General RUSS. Well, if we keep it at 30,000 pounds, which is the mandated weight, that will drive a vehicle of say 120,000 pounds, and that will interface with the current road structure that we have. Maybe not some small bridges, wood bridges, and so on, but by and large the structures that you and I are talking about.

Senator WARNER. Well now, when you say maybe not a bridge, if you have one little bridge just outside of some military base, that is a restriction on this thing. You have suddenly limited a breakout from that base into the highway system. So I am fearful that you had better go back and look at some of these bridges.

Dr. COOPER. Yes, sir, that is a concern. You know, the overpasses are too.

Senator WARNER. I am going to press on that issue. I just want to forewarn you.

Dr. COOPER. We understand that.

Senator WARNER. I think for the moment in my judgment we have to build a system that can break out.

General RUSS. Part of our evaluation is to look at all of the bases and look at all of the areas. We are doing that right now to find out whether there are any of these sort of old, rickety structures that you could not drive on, such that they would not allow a truck, a truck-trailer.

You have seen those places where they say: No trucks and trailers are allowed over this bridge. It is that sort of thing. Certainly, there ought to be sufficient roads and other areas where we can drive.

Senator WARNER. Senator Exon?

Senator EXON. Thank you, Mr. Chairman.

I was much impressed with the slide on accuracy of the MX. It looked excellent and, as near as I could tell by looking at it, you were not very far outside of [deleted] feet on any of those.

And I compliment you also; I think that is an excellent report.

Dr. COOPER. One slight caution, Senator. I do not expect it will change significantly. Those were not full-range tests yet. We have not tested the missile at full range. But personally, I have good confidence that we will be able to attain or better our accuracy goals.

Senator EXON. I assumed they were not full-range. I assume you had enough experience to know, whether it goes 1,000 miles or 3,000 miles.

SOVIET ICBM ACCURACY

Compare that, if you will, with what we know about the best Soviet accuracy. And I have heard and read that the intelligence community is advising us that they may have been giving the Soviets too much credit back there in 1978 and 1979, when we became especially concerned.

What is the most accurate Soviet ICBM and how close is it to the accuracy that you are experiencing with the MX? I do not like the "Peacekeeper" term, so I keep using the term "MX". I hope you understand.

Dr. COOPER. Well, Senator, let me tell you my recollection of what it is, and if someone has more current data please correct me. But the last time I checked, it was the SS-18, Mod 4, that had an accuracy on the order of [deleted] feet. Now, my data is probably limited by a year. Quite frankly, I have to refresh myself.

At the time, that was better than anything that we had that was operational. General Shaud may have something that is a little more precise.

General **Shaud**. Sir, it is [deleted] feet. And as we speak right now, that is the extent of their accuracy. And of course, there would be greater accuracy improvement over time.

That is coupled, Senator, with a slightly larger warhead than we are presently planning on deploying on the MX or the Peacekeeper.

Senator **Exon**. The MX is about [deleted].

Dr. **Cooper**. Our baseline program is [deleted]. We want to make an option in the future to grow that to the order of [deleted] should we need it.

Senator **Exon**. If we had [deleted] then we could go on to 10, is that not right?

Dr. **Cooper**. Sir, I believe we would still be able to carry 10 warheads, yes, sir.

Senator **Exon**. Now, you said the first MX's will be in the [deleted] area?

Dr. **Cooper**. Yes.

Senator **Exon**. How does that compare with the SS–18, Mod 4, I believe you said? How does that compare?

Dr. **Cooper**. Roughly [deleted].

Senator **Exon**. [Deleted].

Dr. **Cooper**. So as you well know, it is a combination of yield and accuracy, small improvements in accuracy buy you a heck of a lot more than small improvements in yield in terms of your hard target kill capability.

Senator **Exon**. How many of the SS–18, Mod 4's, do they have as of now?

General **Shaud**. 308, sir.

Senator **Exon**. Thank you.

I hope you will pardon me for going back to the Titans once again. In his letter to me, General Vessey said that the Titan would only have about a [deleted] chance of destroying a Soviet missile silo, and we have known and recognized for a long, long time that they are nowhere near the accuracy of our missiles.

But when he said that the Titan would have a [deleted] chance of destroying a silo did he mean that it had to land within [deleted]?

Dr. **Cooper**. Senator, I guess in very gross terms it has a yield of about [deleted] which is huge, but it has a CEP on the order of New Jersey, is the way I put it. It has a very large CEP. I do not have that here.

But the combination of yield, even though it is a very large yield, and accuracy is just not sufficient to give you the kill probability that we need. That was the point I was trying to drive home earlier.

If we could make improvements in accuracy there with that large yield, we would have a tremendous kill probability. But it is older technology. It just does not have the accuracy.

General **Fornell**. Sir, the correct number for the accuracy is [deleted] on Titan II. So that is [deleted].

Senator **Exon**. It is [deleted].

General **Fornell**. Yes, sir, [deleted].

Senator **Exon**. Why, then, it is not fair to say that the Titans are more dangerous to the people of Kansas than they are to the Soviet Union, is it?

Dr. COOPER. Senator, we do not look on the Titan as being unsafe. It just is very consumptive in terms of resources to keep it operational.

Senator EXON. Would not the Titan, with its [deleted] be good to keep for ports or fuel tank areas, those kinds of things? Would that not be a tremendous weapon in that area? Say an air base. If you could land a Titan missile within a mile of the runway at Offutt Air Force Base, you would sure do a lot of damage, would it not?

General SHAUD. Sir, let me respond to that, and we will try to stay at the "Secret" level, if you will. As we would approach the Soviet Union, our primary concern, of course, would be their [deleted].

As you know, sir, the Soviets have over 70 percent of their strategic offensive forces within the ICBM's. A little earlier on I was getting at a targeting policy. It ends up that the [deleted].

Well, they are useful to a point, but they do not follow our list of priorities.

Senator EXON. I assume that we have their ports targeted. I do not have a map, but we have maps where they have their ports, their submarine bases. [Deleted.] We have that targeted with Minutemen, I would presume?

General SHAUD. That [deleted].

Senator EXON. So the old, wornout Titan would not be any good for that?

General SHAUD. Well, sir, earlier on, I think, in General Vessey's letter he addressed the possibility of taking out the hardened Soviet ICBM's, and it is fairly——

Senator EXON. I am not talking about hardened targets. I am talking about a port, a submarine port. That is not hardened.

General SHAUD. Well, as we would balance out the offensive resources of the traid [deleted].

Senator EXON. I guess I am not going to get you gentlemen to agree with my theory that the Titans were phased out early to put pressure on developing the MX faster.

Dr. COOPER. No, sir.

Senator EXON. Thank you, Mr. Chairman. I have no further questions.

Thank you, gentlemen.

SOVIET SA-12 MISSILE

Senator WARNER. Gentlemen, the other day we received briefings on the SA-12 missile the Soviets are developing. Well, let us see now. This is the SA-12, the defensive system that [deleted]. But it is a mobile system, and if they want to do a breakout they can suddenly proliferate this defensive weapon.

What analysis have you been able to do on this one thus far? And to what extent are you trying to incorporate some design in the MX and the Midgetman to cope with this system? What I am trying to do is to alert you that the Congress is becoming aware of the SA-12, and it concerns us that we could be building two systems here that could be successfully interdicted.

Dr. COOPER. Yes, sir. General Fornell?

General **Fornell**. Mr. Chairman, one of the focuses of our development program, the advanced strategic missile systems, focuses on those types of systems that would be capable of surviving and/or defeating a defensive system, such as the ABM breakout that you mentioned.

But we have two programs that are approaching full-scale development in that line. One is a passive weapon and one is an active weapon to home in on the type of radars associated with those defensive systems, so that the decoy could not be ignored by the defense.

You can either proliferate the number of reentry vehicles coming in or use a homing device of some sort, as we do in the tactical world, to go after a specific radar.

Senator **Warner**. Is this in the general category of penetration aids?

General **Fornell**. Yes, sir, it is. It is a very active program that we have underway in our ASMS line, which is our 6.3 line or the development line within our RDT&E account, to bring along those technologies. We do not plan on a current deployment of that because we, of course, want to base that on our current estimate of the threat, as well as that projected. We do not see the need to go into full-scale development or production or deployment of that system.

But we are bringing along the technology so that it is available in a time-sensitive way, to be available either on a Minuteman III or a Peacekeeper system.

Senator **Warner**. Would you describe the elements of the advanced strategic missile system in the fiscal year 1985 request, and what level of importance do you attach to that program?

ADVANCED STRATEGIC MISSILE SYSTEMS (ASMS)

Continuing advance development program.
Develops ballistic missile technology for operational ICBM systems.
Ground and flight testing prepares system/subsystems for FSD.
FY 85 program includes: ICBM penetration systems and, advanced reentry weapon systems.

General **Fornell**. Mr. Chairman, in the advanced strategic missile system, this slide describes the program. But as I mentioned earlier, it is the advanced development line for the strategic missile systems.

We are developing a number of technologies, and in the flight tests for systems our 1985 program primarily focuses on penetration aids and a new type of reentry system.

Senator **Warner**. I want to make something clear. This has application to both the Peacekeeper and mobile?

General **Fornell**. Yes, sir, it has application to almost any strategic missile system.

Senator **Exon**. In other words, general research and development?

General **Fornell**. Correct, done in a laboratory type line that we have for software technology.

General **Russ**. It has application to the Navy systems, as well as to the Air Force systems.

General **Fornell**. Yes, sir.

Sir, I mentioned earlier, before your arrival, Senator Exon, that we did have a joint study with the Navy in penetration aids. We do have somewhat unique requirements. However, we are examining that to take advantage of whatever potential we have.

ADVANCED STRATEGIC MISSILE SYSTEMS (ASMS)

S IN MILLIONS

	FY 83	FY 84	FY 85	FY 86	FY 87-FY 89	TOTAL
RDT&E	49.7	74.3	108.3	180.0	923.3	1335.6

FY 85
RDT&E REQUEST
S 108.3

PEN AIDS	48.3
DEFENSE SUPPRESSION SYSTEMS	26.3
ADV RV SYSTEMS	33.7

SCHEDULE

PEN AIDS CONTRACT	AUG 82
DEF SUP SYSTEM START	JUN 84
ADV RV SYSTEMS START	AUG 84

General **Fornell**. As you can see, our 1985 request is broken down. Pentration aids is a significant part, $48.3 million. Defense suppression—that is either of two kinds, passive or active systems; and then advance reentry systems, where we are examining new types of materials, new types of nose cones and things to survive reentry.

We have that in development. A major increase occurs here in that some of the small missile stuff that we started this past year transferred into the ASMS line in 1986, which is a jump. But we are carefully managing that, bringing along the technology and not advancing further than the threat indicates that we should.

Senator **Warner**. In Peacekeeper, under the current program how soon after Peacekeeper deployment could penetration aids be deployed on the missile?

General **Fornell**. Sir, penetration aids could be deployed almost immediately on Peacekeeper. As you may know, we do have penetration aids on Minuteman III, as well as Minuteman II. [Deleted.]

What happens as the reentry vehicle enters the atmosphere, of course, is the chaff is stripped away as it approaches atmospheric effects. So the biggest threat then, of course, is the reentry vehicle is left bare there, without its chaff cover, at about [deleted].

That is what we are watching very carefully on the briefings that you had just in the past couple of weeks on those systems.

Senator **Warner**. Could the availability of penetration aids be accelerated in the face of an ABM breakout?

General **Fornell**. It could be accelerated, sir, yes.

Senator **Warner**. And that acceleration is constrained only by funding and not technology?

General **Fornell**. Yes, sir, what we are trying to do is maintain a reasonable pace between having the technology in hand for application to whatever our current system is, necessary in the targeting equation so as to be survivable as it approaches the target.

Senator **Warner**. In my reference to the SA-X-12, there was some doubt as to whether or not that particular system, the 12, could effectively engage Peacekeeper and Midgetman, in view of the speed at which the reentry vehicles come down. But it did open up a concern among members of this committee as to what the Soviets might have by way of ABM to engage these two systems.

General **Fornell**. [Deleted.]

The technology allows us to insert decoys that are an exact description so far as the radar knows as it comes through that reentry level, so that he has to pay attention to the defensive decoy that is coming after the radar, for example. He cannot ignore and let that pass. He must come after that. So you dilute the system primarily through a flood of other decoy and active weapons.

Senator **Warner**. On Minuteman, describe the deficiencies in the existing Minuteman force that are addressed in the fiscal year 1985 request. How do these deficiencies affect the reliability, maintainability or effectiveness of the Minuteman force?

General **Fornell**. As you know, sir, the aged Minuteman force is made up of 450 Minuteman II's, single warhead, and 550 Minuteman III's, of which we have two versions, with the Mark 12's and 12A's.

The force is aged in that we deployed the Minuteman II in the mid-sixties and began deployment of Minuteman III's in the early seventies. Those systems, of course, are difficult to maintain logistically, and that is what our focus has been primarily.

We have had evidence of rocket propellant liner debonding in which we had to wash out the old rocket motors and replace them. We have had some upgraded programs in reliability. But most of the focus in today's improvement for 1985 is focused on guidance improvements, moving the Minuteman III's down into the [deleted] category of accuracy, perhaps.

Minuteman II has a guidance and control upgrade ongoing as well, and it is bringing it down to a somewhat reasonable range. The focus is on reliability, the focus is on guidance, and the focus is on logistics support and communications, command and control to keep that system viable after being out there for almost 20 years.

U.S. ICBM PROGRAM

Senator **Warner**. Are you concerned that our small ICBM program will drive the Soviets in the direction of mobile ICBM's? Really, what I want you to do is, in both open sessions and to the extent that you want to amplify in closed session, to seal off this argument that our Midgetman is driving them into mobility.

General FORNELL. Sir, they have given ample evidence already that they have moved toward this mobility. We are not driving them to any position.

Senator WARNER. But that is an argument that will be brought up in the course of our debates, and the rebuttal at the moment is largely classified, as I understand it.

The Secretary of Defense will soon release a publication on the Soviet threat, which I understand is due in March. Is that right, Mr. Secretary?

Mr. COOPER. Mr. Chairman, I am not sure of the date.

Senator WARNER. Well, anyway, I was told in a matter of weeks that it would be out. Hopefully, that will address their progress, which is far ahead of ours on mobility. Do you not agree?

Dr. COOPER. Yes, sir.

Senator WARNER. After all, they have a [deleted].

General RUSS. They are concentrating on a [deleted] and the two missiles that we showed last on the slide, the SSX-24 and 25, are both given the capability of being mobile systems.

Senator WARNER. We have also learned a lot from their SS-20 system and the SS-16's.

Dr. COOPER. Sir, I am not sure that that is necessarily all bad. It depends on the conditions and what we can reach in the way of arms control. With a limited force and a single RV ICBM, maybe that would be in our collective best interest. If each side had a mobile ICBM, maybe the tension would go away at that point.

I have heard that argument presented that way, that that would be stablizing. But again, it depends on the conditions, and it comes back to your question of verifiability and whether or not we could ever truly verify that.

Senator WARNER. Senator Exon?

Senator EXON. Well, I would just add to that and give my view of that, which is, yes, they are moving ahead of us right now, from the information that we have. But I do not know what else they could have done. They do not have a triad like we have, a balanced triad.

I have been wondering for years if the sweat was not developing on the brows of the Soviets, when we recognize that 75 to 80 percent of their strength is in fixed silos, that they had to know were becoming increasingly vulnerable. I wonder when they woke up to the fact, like we did in 1978. We may have been a little ahead of ourselves, but we became panicky all of a sudden that maybe we are at risk.

I think they know their situation, and I think that it is only natural that it would go to that. I do not think we should sit back and just forget about it. But I think that is a rational development that they could go to.

Let me go back to a concern that the Chairman mentioned a while ago. We are talking about the SA-X-24—was that the number of it?

Senator WARNER. The SA-12.

Senator EXON. Oh, the SA-12. Well, we are very much concerned, of course, gentlemen, and I think you should be, that if they can develop that the way we think or are afraid they might be, would it be something that would be capable of destroying the

Peacekeeper, or call it what you will, or certainly the B-1, all of these kinds of things, just about the time that we bring them on line?

I suppose that is something that must be worrying you. Would you care to comment on that?

Dr. Cooper. Sir, you are talking about their new strategic missile, as opposed to the SSX-12? Now, there was a 24. On the strategic chart, Mr. Chairman, there was a 24 as well, which is a follow-on.

Senator Exon. Which is the latest, is it not? Is it the SA-X-12? I am sorry, it is not the SX-12, it is the SA-X-12 that I am referring to.

What is that?

Dr. Cooper. Well, one is a surface to air missile. And Senator Warner has been pursuing a line of questioning, relative to whether this could be converted to an ABM system.

The other missile that we talked about earlier—and I think that is the one that you are driving at—is the intercontinental ballistic missile that will conceivably have improved accuracy. And yes, if we do not do something to harden the silos, it will put Peacekeeper at risk.

But of course, we look for survivability in terms of the synergism of the triad.

Senator Exon. I am talking about putting at risk our incoming missiles.

Dr. Cooper. That, of course, is the SA-X-12. Pardon me.

Senator Exon. We had a briefing the other day. Tell me what the number of that new missile is that thay have that we think is a follow-on to the SAM missile? In other words, an expanded, more accurate SAM, and that we think it might be adaptable to an anti-ballistic missile system.

Dr. Cooper. Sir, that is the one we were just discussing. That is the SA-X-12

Senator Exon. All right, the SA-X-12. Now, do you have any more information on that than what we had the other day? Is it a concern that that might be the ultimate weapon that we are always looking for, that could pick these off as they come in?

General Fornell. Senator Exon, we are concerned. The SA-X-12, indication of SAM, may be able to perform [deleted]. And of course, we will observe that and match whatever is required there.

Currently, the [deleted] as we indicated in our development efforts, which are adaptable.

Senator Exon. Now, I assume that this SA-X-12, if it could be adapted, would be particularly effective on that incoming missile of ours that you referred to earlier, after it drops off everything?

General Fornell. Yes, sir, that is where it becomes vulnerable and where you could use a more active system to go after the radar, for example, on that assigned frequency, similar to what we do with tactical systems.

Senator Exon. Is there any practical way that we can develop some of our Stealth technology to that incoming missile, or is that not practical?

General Fornell. Sir, we are examining all ranges right now. General Russ' deputy has just started an initiative to have a transfer between tactical systems with near-zero CEP's for example, and to be sure that we tradeoff that information between the two respective communities.

I think General Russ probably could tell you more about it.

General RUSS. Sir, with the classification of this hearing we probably cannot discuss what we are doing in there. But certainly, there are those possibilities.

Senator WARNER. Of transferring some Stealth technology to the strategic systems?

General RUSS. Yes, sir.

Senator EXON. And I assume that that is being tested, though you did not talk about it, about the advanced thing that you just had up on the board, the advanced testing technology. Is that part of it? Is that part of that ongoing R&D?

General RUSS. Sir, I would just as soon not discuss that right now.

Senator WARNER. You stay within the limits that you can.

Senator EXON. Yes, please do. I understand that.

I have no further questions, Mr. Chairman.

Senator WARNER. Well, let me close this hearing by expressing once again my concern about the Midgetman missile and the deployment concept as being restricted to military bases. When do you think you will be making the decision on that?

Dr. COOPER. On whether or not we will be able to restrict it, Mr. Chairman?

Senator WARNER. Yes.

Dr. COOPER. Well, as General Fornell pointed out, our program in terms of the mobile launcher itself is two-phased beyond this point, actually three-phased. Our next phase is a concept development phase. We have four contractors involved.

We will down-select to two and then we will go to a pre-FSD phase, to be followed by an FSD phase. So that will be some period of time.

You may want to elaborate a little bit, General Fornell.

General FORNELL. Sir, that would be in the timeframe of late 1986, calendar 1986, or early 1987.

Senator WARNER. Well, that is the final decision on the vehicle, right?

General FORNELL. Sir, that brings along the alternative basing concepts to a level of maturity to make decisions. The missile itself will be mature enough, at least subsystems will be tested, to make some conceptual decisions, under General Russ' chairmanship of that steering group.

General RUSS. But I think, to get to your point, a little sooner point than that, Senator, is that this summer we will have tried to zero down on the operational concept and exactly how the Strategic Air Command plans on moving this missile. Certainly, we will continue to make sure that it is capable of operating on and off-base until we get to a final design. That is, it will continue to be able to operate on-base on DOD land, and we will not restrict it from operating off in other types of areas.

Senator WARNER. In the design?

General RUSS. Yes, sir.

Senator **Warner**. So you are giving the committee, now, the assurance that as the design progresses it will not develop in a direction that would preclude interfacing with our interstate highway system?

General **Russ**. That is true, sir. We are not going to preclude interfacing with interstate highways.

Senator **Warner**. That is what I wanted to know.

Thank you very much. This has been a lengthy session. I appreciate your appearances, Mr. Secretary and Generals. Thank you very much.

[Questions submitted for the hearing record follows:]

Questions Submitted by Senator John Warner

ASPECTS OF RESEARCH DELAYED

Senator **Warner**. What aspects of superhardening research were delayed by last year's funding reduction, and how would reductions from the requested funding level this year jeopardize the objectives of the program?

Answer. Fiscal year 1984 congressional funding reductions for superhardening research required the following program restructuring: the large size structure demonstration test was delayed 3 months and one structure model was deleted; one subsize test was deleted; two subsize tests were delayed several months; egress demonstration was delayed 2 months; the shock isolation test facility was delayed 1 year; and simulation and instrumentation development and environmental definition were reduced in scope. These program deletions and delays will reduce the quantity and quality of the technical data available for future basing decisions on Peacekeeper and the small ICBM.

Funding reductions from the planned fiscal year 1985 budget request for superhardening would have significant impact. First, one major program objective is to demonstrate and validate superhardening technology (including structure, shock isolation systems, egress systems) at large scale prior to a basing decision on Peacekeeper or the small ICBM, now planned for late 1986 or early 1987. Further delays and reductions would seriously jeopardize our ability to meet this goal. Second, delays due to further funding reductions would make it extremely difficult to test major large size structures prior to deployment of the 40th Peacekeeper as directed by the Price Amendment to the fiscal year 1984 Authorization Act.

STATUS OF RESTORING $105 MILLION

Senator **Warner**. What is the status of efforts to restore the $105 million for follow-on basing technology that was deleted by the Congress from the fiscal year 1984 request?

Answer. As the Secretary of Defense indicated in his recent progress report to you on this work, we are continuing to review the need to restore all or part of the funds that were deleted for these efforts.

MINUTEMAN FORCE

Senator **Warner**. Does the Minuteman force have an existing capability for the deployment of penetration aids? What is your assessment of the effectiveness of this system to counter existing Soviet ABM deployments, and how robust might it be in the face of a significant Soviet ABM break-out?

Answer. Minuteman currently employs a penetration aid system which is effective [deleted].

RESEARCH INTEGRATION

Senator **Warner**. Could you describe how the results of small missile and hardened mobile basing research will be integrated?

Answer. The Acquisition Strategy for the small ICBM will focus on innovation, competition, dual sourcing, and "good business". This will be achieved by a three phase approach which includes a system definition phase, a pre-full scale development phase, and a full scale development phase. Competing contractors will design and develop the small ICBM and hard mobile launcher separately through the first two phases, with the Air Force Ballistic Missile Office [BMO] performing as the system integrator. Prior to entering full scale development, a single missile contractor and a single hard mobile launcher [HML] contractor will be selected to enter this phase. The BMO will insure that all aspects of missile design and HML design are properly integrated to support an Initial Operational Capability of 1992.

PEACEKEEPER 1986 OPERATIONAL DATE

Senator WARNER. Are all aspects of the program on schedule to meet the 1986 operational date for Peacekeeper? What aspects of the program involve the most risk relative to meeting the initial deployment date?

ANSWER. The Air Force is committed to and is confident that it can meet the scheduled Peacekeeper IOC in December, 1986. All aspects of the program are on schedule and there are no foreseeable hurdles that cannot be overcome to meet IOC.

The aspects of the program that involve some risk include warhead deliveries and basing hardware deliveries. However, the Air Force has taken aggressive management action to ensure that the risk is minimal and manageable.

INCORPORATING PEACEKEEPER TECHNOLOGY

Senator WARNER. To what extent is Peacekeeper technology being incorporated into the small ICBM design?

ANSWER. Peacekeeper technology is being incorporated into the small ICBM in a variety of ways. First, the Small Missile Independent Advisory Group, headed by retired General Bernard Schriever, recommended the use of a lightweight version of the Advanced Inertial Reference Sphere [AIRS] guidance system and use of the MK 21 reentry vehicle (both being developed for Peacekeeper) to provide minimum risk for small missile deployment. Additionally, canister technology developed for Peacekeeper could have applicability for the small ICBM. Peacekeeper design incorporates the latest technology in booster propulsion, such as extendable nozzle exit cones, carbon-carbon structure, and lightweight, high energy propellant. Such developments from the Peacekeeper program may be necessary to form the basis of meeting the Congressional mandated weight for the small ICBM. Finally, Command, Control, and Communications (C^3) technology for the small ICBM will take advantage of the experience gained on Peacekeeper work to date.

PEACEKEEPER AGAINST SOVIET TARGETS

Senator WARNER. What is your assessment of Peacekeeper's capability against the hardest Soviet targets? Does the yield selected for the Peacekeeper warhead maximize effectiveness against hard targets?

ANSWER. The yield and CEP combination of Peacekeeper is sufficient to achieve acceptable damage against the current generation of SS-18 and SS-19 ICBM complexes. If the Soviets choose to upgrade these facilities using the U.S. superhard technology, it would be necessary to either reduce the CEP or increase the warhead yield (or both).

In addition to the large array of surface targets, we suspect that the Soviets may have a number of buried command and control facilities. The Peacekeeper Missile has marginal effectiveness against these targets.

CAPABILITY OF EC-135 AIRCRAFT

Senator WARNER. Please describe in more detail the capability of the EC-135 aircraft to monitor each MX missile. What additional effectiveness does this capability provide?

ANSWER. The Strategic Air Command's EC-135A, C and G aircraft will have the capability to command launch of each Peacekeeper missile, as directed by The National Command Authorities. The current Minuteman Airborne Launch Control System [ALCS] is similar to this planned Peacekeeper capability.

The Peacekeeper ALCS capability will provide additional effectiveness in three areas. First, the aircraft will be able to monitor vital Peacekeeper missile status in order to verify the operational condition of each missile. Second, the aircraft will have the capability to retarget the Peacekeeper missiles. Also, positive enable controls will be added to the aircraft which will provide nuclear safety features that have already been incorporated into all ICBM ground Launch Control Centers [LCC].

These elements of the Peacekeeper ALCS will provide a more safe and effective command and control center and also support the President's priority for improving our strategic C^3 capability.

Questions Submitted by Senator Dan Quayle

MANEUVERING REENTRY VEHICLES

Senator **Quayle**. In Secretary Weinberger's 13 January report to the Congress on the ICBM modernization program, he mentions that you are investigating the development of maneuvering reentry vehicles.

Do we have any evidence that the Soviets are conducting research with maneuvering reentry vehicles?

Answer. [Deleted.] In particular, we assess that the [deleted]. Given a requirement for either high accuracy, antiballistic (ABM) defense evasion or other special missions, the Soviets could [deleted]. In the late [deleted] or early [deleted] the Soviets could begin flight-testing of an [deleted].

TECHNOLOGICAL LIMITATIONS

Senator **Quayle**. What are the technological limitations in this area? Will we eventually see such a vehicle deployed on the new "small missile"?

Answer. The technological limitations for maneuvering reentry vehicles [MaRVs] depend on performance requirements and potential missions. MaRVs could be used to evade future Soviet anti-ballistic missile interceptors and/or to gain increased accuracy against possible extremely hardened targets.

These vehicles would require a guidance system in the RV to control reentry maneuvers—for evasion or improved accuracy. A terminal fix system could provide sufficient capability for high accuracy missions, but has not yet been demonstrated for ICBMs. A MaRV would have to withstand the physical environment of reentry including high acceleration maneuvers and flight through hostile nuclear environments. Size and weight are possible limitations of a MaRV guidance system.

MaRVs are not presently needed to satisfy the requirements for the small ICBM against projected Soviet threats. Therefore, MaRV development is not part of the baseline system for the small ICBM. In fact, MaRV research will be funded solely in the Advanced Strategic Missile System [ASMS] technology program beginning in 1986. However, continued research on MaRVs is prudent as a hedge against Soviet ABM breakout or if further Soviet hardening of critical targets negates the effectiveness of purely ballistic systems. Any future requirement to deploy MaRVs depends on these Soviet threats materializing.

VEHICLE DEPLOYED ON SMALL MISSILE

Senator **Quayle**. Can you briefly summarize the work the Air Force and Navy are doing in this area? I understand they are taking two different approaches.

Answer. Research on maneuvering reentry vehicles (MaRVs) and other penetration aids is conducted through the Advanced Strategic Missile System [ASMS] technology program. Different developmental approaches on MaRVs reflect the different missions such a weapon may be required to perform. MaRVs could be used to evade possible Soviet ABM defenses or to gain increased accuracy.

Two MaRVs have undergone advanced development—the Navy's MK 500 and the Air Force's Advanced Maneuvering RV [AMaRV]. The Navy's MK500 was developed as near-term operational replacement for the Trident I MK4 to evade defense interceptors.

The Air Force's AMaRV was a technology test vehicle that demonstrated an advanced maneuvering control system and inertial guidance system. This technology provided the maneuvering reentry vehicle program with increases in performance capability required to evade the projected advanced defense interceptors while maintaining effective system accuracies. Both MaRVs were "put-on-the-shelf".

The Air Force and Navy are conducting a joint study (under USDRE) to evaluate ICBM/SLBM penetration system candidates to counter future possible Soviet ballistic missile defenses. The MaRV is one of the candidates. Continued research and development on MaRVs provides a prudent hedge against Soviet defense upgrades or further hardening of critical Soviet targets. Future MaRV deployment requirements will depend on these threats materializing.

POLITICAL AND MILITARY IMPLICATIONS

Senator **Quayle**. Could each of you give us your views on what you believe the political and military implications would be if Congress cuts funding for the MX missile this year?

Answer. If funding for the Peacekeeper was cut to zero, the lynch pin would be pulled out of the President's Strategic Modernization Program jeopardizing deterrence of Soviet aggression and making a shambles of current U.S. arms reduction proposals. The political ramifications would not only be felt in the proposed U.S./Soviet arms reduction negotiations, but also affect relationships with U.S. allies. Our inability to continue the Peacekeeper program would cast a shadow on American resolve in the eyes of both friends and enemies, detracting from our ability to influence international decisions at the diplomatic level.

The military implications of a total cut would be equally severe. Peacekeeper is desperately needed to place Soviet Command Centers and ICBM complexes at risk. Without it, these critical Soviet Strategic assets are in relative sanctuary from retaliation. With this advantage the Soviets could well be tempted to coerce either the U.S. or our allies knowing that our ability to retaliate could not threaten their critical war resources. Unfortunately, without Peacekeeper there is no near-term solution to this military shortfall.

While lesser cuts would reduce the severity of these impacts, it should be noted that the President's Strategic Modernization Program is an integrated effort specifically designed to resolve a serious shortfall in our ability to implement U.S. national deterrent policy. Any delay or reduction in scope of this effort will impede our progress in resolving that problem. In addition, fiscal year 1985 program reductions would add significantly to the total program cost due to deployment schedule perturbation and procurement inefficiencies.

PERCEPTIONS ON STRUCTURAL HARDNESS

Senator **Quayle**. In your joint statement you say that tests show we may be able to achieve hardness levels over 50 times greater than those of current U.S. silos. What has changed about our perceptions on structural hardness? Are the Soviets out ahead of us in this area?

Answer. Our perceptions on structural hardness have been changed by the results of design, analysis and numerous scale model tests accomplished under the superhardening technology program. Results indicated that suitably designed structures containing rebar, concrete and an inner steel liner can survive extremely high overpressure levels without structural failure.

The Soviets are currrently out ahead of us in application of silo hardening technology. They have deployed silos which are assessed at several times the hardness of our Minuteman silos from a targeting perspective.

INCREASED FUNDING FOR STUDY

Senator **Quayle**. Based on your finding thus far, will you be requesting increased funding for further study on hardening techniques, given the promising indicators you have seen?

Answer. We continue to believe that superhardening offers the potential for improving the survivability of land based ICBMs. The reduction in funding has caused some delays in the experimental program. We are still carefully reviewing the requirements for additional funding.

PROGRESS REPORT

Senator **Quayle**. Can you give us a progress on your studies regarding the deep basing of strategic assets? I understand a major review of those activities is scheduled for this month in DOD.

Answer. A major review of the systems engineering technology development program for deep basing of ICBMs was held in March. The progress review focuses on the fiscal year 1984 program and what is planned for fiscal year 1985. the current work and plans for fiscal year 1985 were accepted because the program is and will produce information applicable to a variety of strategic missions.

In addition to this review OSD has established a working group chaired by the Deputy Under Secretary for Strategic and Theater Nuclear Forces to define appropriate alternative strategic missions that should be located deep underground. This group will report results of their findings to the Secretary of Defense early this summer.

DEEP BASING OF ICBM'S

Senator **Quayle**. What do you expect from this study? Do you believe deep basing of ICBM's is feasible and affordable?

Answer. The goal of studying deep basing is to demonstrate the feasibility of placing and protecting strategic assets deep underground and then be able to utilize them when required. Results of Air Force efforts so far have demonstrated the ability to "dig out" from underground using state-of-the-art tunnel boring machines. However, other aspects of the facility such as power, heat dissipation, and life support need to be answered. Studies to address these questions will be accomplished as the development program progresses.

As to whether deep basing of ICBMs is affordable remains to be answered. Part of the overall program is to define associated costs so decisions can be made based on both military utility and cost of such a system.

MX VERSUS THE SMALL MISSILE

Senator Quayle. Could you summarize for us the roles and missions of the MX versus the small missile? How will these two systems work to complement one another in the future?

Answer. The roles of Peacekeeper and the new Small ICBM are similar and complementary.

Peacekeeper is needed now to redress a current imbalance in U.S./USSR prompt, hard target capability and provides the only near-term solution to this problem. It has the added advantage of presenting the Soviets with an incentive to enter serious negotiations for meaningful arms reductions.

The Small ICBM will have a yield/accuracy combination comparable to Peacekeeper as well as enhanced survivability. In addition, its single warhead feature will provide improved targeting flexibility and enhance stability by further supporting arms reduction objective and presenting a negative incentive for Soviet preemptive attack.

SILO-KILLING CAPABILITY

Senator Quayle. It has been said that the small missile will be expected to do too much: That it will be required to threaten any target, including silos. Is it your intention to develop a silo-killing capability for the small missile?

Answer. Yes. The Small ICBM is being baselined with an accuracy/yield combination comparable to Peacekeeper. The requirement to place hardened Soviet Command and Control Centers and ICBM complexes at risk applies to both of these new systems and is one of the most critical elements on the ICBM Modernization Program. This common capability is based on the recommendations of the Scowcroft Commission and is needed to support validated military requirements. While guidance technology for the Small ICBM is considered a key technical challenge, development engineers will be able to build on the Peacekeeper Advanced Inertial Reference Sphere design and have good confidence in achieving the accuracy goal by the early 1990s.

IMPROVE ACCURACY OF MISSILE SYSTEM

Senator Quayle. I have read a good deal about the various research and development missile guidance programs the Air Force has underway and of the need to make our missiles accurate. Is it Air Force policy to try to improve the accuracy of our missile systems?

Answer. Since the early days of the ICBM, the Air Force has been evaluating and implementing guidance hardware and software upgrades to improve the accuracy of the missile system. The key parameter in an ICBM's capability to effectively damage targets is its accuracy. For example, a system that has a 300 foot circular error probable [CEP] can accomplish an equal amount of damage on the same target for less that one eighth the yield that a 600 foot CEP system would require. This leverage has allowed us to use lower yield weapons while maintaining military effectiveness. We plan to continue research and development programs to improve ICBM accuracies, but we will implement these upgrades only when it is necessary to meet actual mission requirements.

CURRENT ESTIMATES

Senator Quayle. The most recent edition of Aviation Week, March 5, 1984, indicates that the MX ICBM will have a circle of error probable [CEP] of approximately 300 feet and will have 300 kiloton warhead. Does this missile accuracy and yield combination reasonably reflect the Air force's current estimates of what is needed to "kill" a Soviet missile silo?

Answer. Yes, this yield and accuracy combination is reasonable to provide a high probability of "kill" against the hardest Soviet missile silos currently deployed. The [deleted] yield, combined with the design CEP of [deleted] and the advanced fuzing systems incorporated in the MK21 reentry vehicle, provide single shot probability of damage [SSPD] over [deleted] against existing Soviet silos where close (approximately [deleted]). Should [deleted] the SSPD would be over [deleted].

BASIC FORMULA

Senator **Quayle**. I understand that the ability to kill a target goes up quite dramatically with increases in missile accuracy. What basic formula does the Air Force use to calculate missile probabilities?

Using this formula, what yield warhead would be required to kill a Soviet silo today if our missiles had CEPs of 0?

Answer. Rather than one basic formula for calculating missile kill probability the Air Force uses several of varying complexity to handle the wide range of variables and uncertainties which must be addressed in detailed assessments of kill probability. One of the more simple versions which highlights the effect of CEP is SSPD = $1-(0.5)\,(WR/CEP)^{2}$ where: SSPD is the single shot probability of damage for one arriving reliable weapon; WR is the weapon lethal radius against the target; and CEP is a measure of weapon accuracy. For a fixed WR (where CEP equals WR) if the CEP were improved from 1 WR to .5 WR the SSPD would increase from 0.5 to 0.94, which is impressive.

A different formulation of the problem is required for the very low CEP's (10's of feet) and small yields where the lethal weapon radius approaches the target dimensions.

STUDY

Senator **Quayle**. Has the Air Force or the DOD have any study now underway to determine the functional hardness or vulnerability of Soviet targets as distinguished from the hardness of Soviet concrete silos per se?

Answer. The Air Force Foreign Technology Division [FTD], in conjunction with the Air Force Weapons Lab [AFWL], and the Aerospace Corporation of Los Angeles, California, have done extensive analyses of [deleted]. Within the limits of Intelligence data we have, we are confident that [deleted] [See atch]. The analysis used state-of-the-art shock isolation systems and techniques described by the Soviets in open literature.

In addition, for several years, the Defense Nuclear Agency [DNA] has conducted a silo test program [STP] designed to provided data which can be used to evaluate the [deleted]. In 1984, the STP will include a one-eighth scale model, based on the intelligence data available, of [deleted] silo. The test will include a simulated [deleted] and will yield important data on some of the capabilities of the silo and shock isolation system we estimate for the [deleted]. These data, along with our analytical assessment techniques, will be used to improve our estimates of the hardness of [deleted]. However, our knowledge of the specific details of the [deleted] is still very limited. Until some of the gaps in our knowledge are filled, our estimates will remain uncertain.

GUIDANCE PROGRAM FOR MX ICBM

Senator **Quayle**. The Aviation Week article of March 5, 1984 indicates that the Defense Department intends to spend nearly $1 billion to provide terminal guidance technology to "increase accuracy against hardened targets in the mid-1990s." This article also indicates that DOD is "likely to include adaptations" of the terrain contour matching system currently in use for our cruise missiles and of the radar area correlation guidance similar to that deployed on the Pershing II. Why isn't such a guidance program being pursued for the MX ICBM?

Answer. Terminal guidance systems are being developed as a hedge against possible future Soviet ABM systems or further Soviet hardening of critical targets which might negate the effectiveness of purely ballistic systems. They are not presently needed to satisfy Peacekeeper accuracy requirements against projected Soviet threats. Peacekeeper flight tests have indicated that accuracy estimates are reasonable and, if achieved, inertial systems can provide the accuracy necessary to hold currently projected Soviet hardened targets at risk.

500 KILOTON

Senator **Quayle**. "Parallel Programs Advance Small ICBM" in Aviation Week and Space Technology, 5 March 1984, indicates that the SICBM is likely to carry a 500 kiloton warhead. How accurate is this account?

Answer. The article is inaccurate since it implies that a decision has been made on the yield for the SICBM warhead. The baseline warhead for the SICBM is the

W-87, developed for the Peacekeeper. However, it has not yet been decided what yield will be used for the W-87 on the SICBM. The yield chosen will be based, in part, on the demonstrated accuracy of the SICBM's guidance system and Soviet hardening programs.

GUIDANCE SYSTEM

Senator **Quayle**. Won't the guidance system on the SICBM, which is to be terminal not simply inertial, produce greater accuracies than the guidance system for the MX ICBM? If so, why should it have a warhead whose yield is as great or greater than the MX warhead? Does the reason have anything to do with the closeness of the IOC and the desire to "avoid risk" as the "Aviation Week" article suggests?

Answer. The guidance system for the SICBM is planned to be inertial, not terminal. However, design requirements to support the small missile in a mobile mode will stress available technology to insure that the SICBM is as accurate as the MX. According to the recommendations of the Air Force Small ICBM Independent Advisory Group Report (Sept 83), a lightweight version of the Advanced Inertial Reference Sphere [AIRS] guidance system should be the "Baseline" guidance system for the small ICBM. They also recommended that parallel development programs for guidance systems such as Ring Laser Gyro Systems and Stellar Inertial measurement units should be conducted for possible incorporation at later phases in the program.

A warhead yield decision for the small ICBM has not been made. Such a decision will depend on the demonstrated or projected small ICBM accuracy and the projected hardness of Soviet facilities against which it will be targeted.

ACCURACIES OF TERMINALLY GUIDED MISSILES

Senator **Quayle**. Have we done extensive, long-range, real-world flight tests to determine precisely what the exact accuracies might be with terminally guided missiles? How many?

Answer. There has been no long-range (intercontinental) flight testing for terminal guided ICBM reentry vehicles. Many terminal fix guidance system [TFS] concepts have been tested on aircraft captive-carry, cruise missile, and intermediate-range ballistic missile flights. Although these tests do not represent the more severe and demanding ICBM trajectory environment, some of the data can be used with engineering analyses to estimate accuracies of less than [deleted] for an ICBM maneuvering vehicle (MaRV) with a TFS. The Advanced Strategic Missile Systems program is evaluating many TFS concepts for an ICBM MaRV application. Once initial system requirements and definition studies are complete, the candidate concepts will be narrowed to one or two and flight tested on Minuteman I boosters at ICBM ranges. These tests will demonstrate TFS performance in an ICBM trajectory environment.

POSITIONING SATELLITES

Senator **Quayle**. Much has been said about the vulnerability of our satellites including the positioning satellites that would be helpful for giving mid-course correction to Trident II and the SICBM. It is my understanding that our positioning satellites transmit 24 hours a day, are in geosychronous orbits, and are vulnerable to nuclear and directed energy weapons. Are we yet working on the next generation of positioning satellites?

Answer. The Navstar Global Positioning System, which is our next generation satellite based positioning system, is one of the most survivable satellite systems yet developed. [Deleted.]

OPERATING ONLY IN CRISES

Senator **Quayle**. Is there any attention being given to sending up simple, single—military purpose positioning satellites that would only operate when needed in crises?

Answer. Navstar GPS is one of the least complex statellites in the USAF inventory. It is also the most inexpensive satellite (less than $50 million per satellite) currently in production. The 21 GPS on-orbit satellites will assure position accuracy under all conditions, even during crises, providing critical improvements to the military capability of U.S. and allied forces. The crises-only system you have suggested would not satisfy our military requirements during the remainder of the conflict spectrum, nor would it be cost effective. Therefore, we have not developed such a capability.

LAUNCHING SATELLITE PROGRAM

Senator **Quayle**. Does the Air Force have any program to make it difficult for the Soviets to know when we are launching a satellite or to make it difficult for them to see a satellite once it is launched?

Answer. Yes, the Air Force does have a program to make information gathering more difficult for the Soviets. Key information on the satellites before and after launch is protected. Launch dates of satellites placed in orbit with expendable launch vehicles are classified until after the event. While shuttle launch dates are unclassified, specific deployment plans for Air Force satellites aboard the shuttle are classified. The orbital parameters of many Air Force satellites are classified for the duration of their missions and communications with many satellites are encrypted. In addition, many operations security measures are taken to protect launch dates and orbits.

LOCATING LARGE NUMBER OF SATELLITES

Senator **Quayle**. Has there been any study done on the desirability of locating a large number of simple positioning satellites at spots close to Soviet satellites so that the Soviets could not be sure of blinding themselves if they attack our satellites?

Answer. In 1973, the DOD decided to develop a single, space based system—the Navstar GPS—to improve overall positioning & navigation performance to users and eliminate several rapidly proliferating costly Federal radio navigation systems. The DOD/DOT Federal Radionavigation Plan is our roadmap, and we in the DOD are well on the way to accomplishing this objective.

GPS is a highly survivable system that will have an 18 satellite constellation (plus spares) optimized to provide worldwide, continuous three dimensional coverage. The Soviet counterpart to GPS is GLONASS which will be in orbits similar to GPS but will have only 9-12 satellites providing only two dimensional coverage, possibly not worldwide. Repositioning our sole space-based navigation asset to orbits close to GLONASS would: (1) decrease the military utility of GPS, since GPS would no longer be able to provide continuous, worldwide, three dimensional coverage; (2) not increase survivability, since our current orbital spacing and proliferation of satellites in six different orbital planes already makes GPS one of the most survivable space systems ever developed; and (3) hinder the ability of the NUDET Detection System payload on the satellite to accomplish its mission of highly accurate worldwide, continuous NUDET detection both in peacetime for treaty monitoring and in wartime for battle management purposes.

PLACING SATELLITES FATHER IN SPACE

Senator **Quayle**. Have we ever attempted to put our satellites 4 or 5 times farther out in space than where we currently have our Navstar satellites? Would such distancing make it more difficult for the Soviets to find our positioning satellites?

Answer. We have studied the deployment of Navstar GPS satellites at several orbital altitudes. We believe the current orbital deployment concept represents the best tradeoff between cost, survivability and operational utility. For example, deploying GPS at higher altitudes would require larger satellites to generate the additional power necessary to provide jam resistant navigation at or near the Earth's surface. The larger satellites launched to higher orbits would also require larger boosters. These two factors alone would nearly double the cost of the GPS satellite segment. More importantly such distancing would not make it more difficult for the Soviets to find our GPS satellites because their continuous radiated navigation signals would reveal their positions.

SAC SHORT IN DETERRENT FORCES

Senator **Quayle**. An aide of mine who was taken on a tour of SAC recently reported to me that officials told him that SAC "feels it is ⅓ short" of what it needs in the way of deterrent forces to do its job. Specifically, what does SAC feel it is short of to do specifically what task other than a second strike capability?

Answer. "Deterrence—How Much is Enough" is a briefing which [deleted] in a war-gaming analysis of [deleted]. It states that [deleted]. As is pointed out in the briefing, fiscal year 1984 forces provided deterrence [deleted]. SAC's modernization program, if executed on time, will [deleted] to the military component of deterrence. Deferral of modernization would either postpone the reduction of that [deleted] as the threat evolves.

Fiscal year 1984 forces [deleted] against those targets which pose the greatest, most immediate threat to the U.S.—the hardened and mobile nuclear attack assets fielded by the Soviet Union. As the Soviets pursue modernization, failure to maintain, on schedule, our modernization programs only [deleted]. In addition, real opportunities to reduce nuclear arsenals with arms control can be lost through a lack of negotiating leverage.

ONE WARHEAD MISSILES

Senator **Quayle**. If SAC needs more forces, why is it going with 1,000 missiles with only one warhead each?

Answer. Deployment of a small, single-warhead missile is consistent with the President's strategic modernization plan as recommended by the Scowcroft Commission. The first step in that program is the deployment of 100 Peacekeeper missiles in Minuteman silos which will help redress today's critical prompt hard target capability imbalance that exists between the United States and the Soviets. The follow-on deployment of a single-warhead missile in a survivable basing mode in the early 1990s is the second step in the modernization program and will provide the impetus to move both the U.S. and Soviets toward a more stable nuclear deterrent force. While the final number of small, single-warhead missiles needed has not yet been determined, it is likely that our ICBM forces through the 1990s will consist of 100 Peacekeepers and a combination of Minuteman and single-warhead missiles. The Soviet threat, basing mode for the small ICBM, and progress of arms control negotiations will be major factors in determining the final number of small ICBMs required to maintain the ICBMs as a viable leg of the Triad.

Questions Submitted by Senator Sam Nunn

DEACTIVATION OF TITAN

Senator **Nunn**. I have heard from some people that the decision to deactivate the Titan was based solely on cost considerations; others say it is related to arms control. Can you definitively answer this issue, and also tell me what the status of the deactivation is?

Answer. In October 1981, when the President announced the decision to retire the Titan IIs, the primary rationale was that the dollars saved by retiring the system could be more effectively applied to modernizing our strategic forces. Cost saving remains a valid reason for continuing the deactivation program. Our modernization efforts not only redress the increasing imbalance in counter-military capability vis-a-vis the Soviets, they also provide the negotiating leverage we need to persuade the Soviets to bargain seriously in the Strategic Arms Reduction Talks.

Subsequent to the October 1981 decision to deactivate the Titan IIs, the Joint Chiefs of Staff recommended to the Secretary of Defense in November 1982 that the Titan II launchers be dismantled to permit their removal from arms control accountability. In accordance with the SALT I Protocols, the United States is permitted an increase in submarine launched ballistic missiles (from 656 to 710) if the Titan II launchers are dismantled. By taking this action, the United States will remain within the SALT I limits without having to dismantle as many Polaris or Poseidon submarines as would otherwise be required as Trident submarines are deployed. Thus, while the SALT I dismantling program was not part of the original rationale for Titan II retirement, it is now an important consideration in continuing the Titan deactivation and dismantling programs.

I hope this information helps explain why the arms control rationale has been cited recently as a reason for Titan II retirement and dismantlement. I believe that the combination of cost savings and arms control considerations warrants our continued commitment to retiring the Titans and moving ahead with the President's strategic modernization program.

The deactivation program is well underway. To date, 15 missiles have been removed from alert. Thirty-seven Titan IIs remain operational, three at Davis-Monthan Air Force Base and 17 each at McConnell and Little Rock Air Force Bases.

LIMITED NUCLEAR ATTACKS

Senator **Nunn**. General Russ, in the fiscal year 1985 Budget Estimates document you state "Peacekeeper, in existing silos, will reduce the current Soviet advantage in ICBM capability and help deter the threat of conventional or limited nuclear attacks on the United States and its allies." It seems to me that with all those MX warheads in just 100 Minuteman silos, any limited nuclear attack plan by the Soviets would surely include an attack on those vulnerable missiles wouldn't it? Doesn't this weaken deterrence of limited nuclear attack rather than strengthening it, as you assessed?

Answer. No. While we can't know the details of Soviet strategic planning, it is certain that the ability to retaliate against critical Soviet strategic assets will enhance deterrence. As long as the Soviets perceive their ICBMs in sanctuary from U.S. retaliation they will be tempted to capitalize on this advantage by coercion of the United States or our allies. Peacekeeper threatens this sanctuary and by creating uncertainty in Soviet planner's minds, will contribute to deterrence at all levels of conflict from theater conventional to general nuclear.

PAYLOAD CAPABILITY

Senator **Nunn.** General Russ, bearing in mind that there exists a congressional prohibition on the small ICBM exceeding 33,000 pounds, and a reporting requirement if it exceeds 30,000 pounds, are we inhibiting or overconstraining the design effort? I am concerned that the payload capability not be unduly constrained, since I can conceive of future threats that might require us to add penetration aids, maneuvering capability, terminal guidance—and maybe even some hardening, all of which would add weight, I just want to be sure you aren't going to be reluctant to seek some relief, if needed.

Answer. We believe that development of a small ICBM by late 1992, weighing 30,000 lbs or less, carrying a nominal payload of 1,000 lbs to a nominal range of 6,000 NM is within the reach of U.S. technology. If unforeseen technical difficulties were to arise during the pre-full scale development or full scale development phases, or if there were a significant change in the threat, the Air Force would notify the Congress and identify alternative approaches.

SMALL ICBM IOC

Senator **Nunn.** This committee and the full Congress directed last year that the small ICBM be pursued with high priority. While your reports of progress are encouraging, there remains a question about why it should take until 1992 to achieve IOC for a system directed to be undertaken as a high priority activity in 1983. By comparison, we managed to land men on the moon in less time from the commitment decision than you claim you need just to develop a single-warhead ICBM. Why does it take so long and why can't we mobilize industry to move more rapidly? Is this program funding constrained or technology constrained.

Answer. The small ICBM program is being pursued following the directives of Congress and the recommendations of the Scowcroft Commission and the Small Missile Independent Advisory Group (Schriever Group). The Congress directed that the missile weigh no more than 33,000 lbs. The Scowcroft Commission stated that the small missile development effort "need not and should not be burdened with the uncertainties accompanying a crash program; thus its timing can be such that competitive development is feasible." The Schriever Group concurred with the Scowcroft Report and further provided a comprehensive small ICBM acquisition program reflecting the highest national priority while taking advantage of available time to follow an orderly development and deployment schedule. It is believed that such a program will provide high confidence in a 1992 Initial Operational Capability (IOC) for the small ICBM, while providing the flexibility needed to respond to arms control initiatives and changes in the Soviet threat. Although certain aspects of the small ICBM program might be accelerated with increased funding, other aspects, such as the missile guidance system and hard mobile launcher probably could not be accelerated.

CUT MX TO 20 MISSILES

Senator **Nunn.** It is clear that a great deal of money is going to have to be cut out of the defense budget request this year to meet the likely authorization amount. The MX request this year is for $5 billion, made up of RDT&E, procuring 40 missiles, converting Minuteman silos, other MILCON, and support and spares. What would be the impact and what would be the new funding request if the Congress were to say, cut the program to only 20 missiles?

Answer. The reduction of the fiscal year 1985 Peacekeeper procurement from 40 to 20 would result in short-term reduced cost, but the long-term penalties would be severe. The reduced fiscal year 1985 level would not allow achievement of the required operational capability of 100 missiles by December 1989. While the fiscal year 1985 cost would be reduced by approximately $530 million, to defer the 20 missiles to the end of the production line would require the addition of approximately $1170 million in the outyear budgets due to reduced production efficiency and inflation, and result in a two month slip in FOC. The suggested reduction would procure fewer missiles in fiscal year 1985 than are already funded for fiscal year 1984. The result is a significant cost penalty in a year when we would normally be bringing production to a cost efficient and sustainable rate. Moreover, since the deployment rate would be affected, our orderly construction plans and expenditures in Wyoming and Nebraska would be disrupted. Additionally, a delaying action would fail to adequately address the most severe threat ever posed to the United States by Soviet strategic forces, and would send a signal to the Soviets that their intransigence at that arms control table was being rewarded.

SUPERHARDENING TECHNOLOGY

Senator NUNN. In light of the unexpected progress in superhardening technology, first, is that effort adequately funded in your fiscal year 1985 request, and second, at what point in the program could we confidently decide to be either MX or the small missile in superhard silos?

ANSWER. We remain concerned with the level of funding in this area in view of the congressional reduction last year. We are still assessing if current funding levels will permit us to support a decision in late 1986 or early 1987 for deployment with the small ICBM or Peacekeeper. Sufficient data should be available at that time to allow a smooth transition to a full scale development program for superhard silos for either the small ICBM or Peacekeeper if the Nation opts to do so.

FEASIBILITY OF SUPERHARDENING

Senator NUNN. Is superhardening more feasible for small ICBM's than for a longer, heavier and larger diameter missile like the MX?

ANSWER. It is still too early to assess whether superhardening would be more feasible for the small ICBM or Peacekeeper. These questions are being addressed in our current superhardening technology program.

Senator WARNER. The subcommittee is adjourned.

[Whereupon, at 5 p.m., the subcommittee was adjourned, to reconvene upon the call of the Chair.]

DEPARTMENT OF DEFENSE AUTHORIZATION FOR APPROPRIATIONS FOR FISCAL YEAR 1985

FRIDAY, MARCH 9, 1984

U.S. Senate,
Subcommittee on Strategic and
Theater Nuclear Forces,
Committee on Armed Services,
Washington, DC.

AIR-BREATHING DETERRENT

The subcommittee met, in open session pursuant to notice, at 8:58 a.m., in room SR-222, Russell Senate Office Building, Senator John W. Warner (chairman) presiding.

Present: Senators Goldwater, Wilson, and Levin.

Staff present: Robert F. Bott, William E. Hoehn, Jr., professional staff members; Douglas R. Graham, research assistant; Karen A. Love, staff assistant.

Also present: Gerald J. Smith, assistant to Senator Goldwater; Mark J. Albrecht, assistant to Senator Wilson; Jeffrey B. Subko, assistant to Senator Exon; Peter D. Lennon, assistant to Senator Levin.

OPENING STATEMENT BY SENATOR BARRY GOLDWATER, PRESIDING

Senator Goldwater. The meeting will come to order. Senator Warner, because of the snow, is delayed. I almost could not make it home last night. I parked my car in somebody's driveway and walked a mile in the snow and walked back a mile this morning and it was still there. [Laughter.]

The subcommittee meets this morning to receive testimony in support of the 1985 request for the air-breathing deterrent. We are pleased to welcome back Dr. Thomas Cooper, the Assistant Secretary of the Air Force for Research, Development, and Logistics. We welcome also Lt. Gen. Robert Russ, Maj. Gen. William Gorton, and Maj. Gen. John Shaud.

This hearing will establish the record on which we justify our recommendations on the programs in this area. Gentlemen, we look forward to your report on the progress that is being made in carrying out this important aspect of the strategic modernization program.

If you have prepared texts, you can submit them for the record and they will be printed as if read and then you can just run through whatever you want to say. So let's begin.

STATEMENT OF HON. THOMAS E. COOPER, ASSISTANT SECRETARY OF THE AIR FORCE FOR RESEARCH, DEVELOPMENT, AND LOGISTICS, ACCOMPANIED BY. LT. GEN. ROBERT D. RUSS, DEPUTY CHIEF OF STAFF FOR RESEARCH, DEVELOPMENT AND ACQUISITION, U.S. AIR FORCE; MAJ. GEN. WILLIAM A. GORTON, USAF, DIRECTOR OF OPERATIONAL REQUIREMENTS AND DEPUTY CHIEF OF STAFF FOR RESEARCH, DEVELOPMENT AND ACQUISITION; AND MAJ. GEN. JOHN A. SHAUD, USAF, DIRECTOR OF PLANS AND DEPUTY CHIEF OF STAFF FOR PLANS AND OPERATIONS

Dr. COOPER. Thank you, Senator Goldwater. Indeed, in spite of the snow, we are pleased to be back today. We were here on Tuesday to discuss the ICBM modernization program and we had a very thorough discussion of that and we look forward to the discussion today on the air-breathing leg.

I think we have a good story to tell. I might just divert for a minute and say we very much appreciated, Senator, your attendance at our Worldwide Commanders Conference here several weeks ago.

Senator GOLDWATER. It was the best night I have had in a long time.

Dr. COOPER. We enjoyed it, too.

As I mentioned, today we are here to discuss the air-breathing leg of the strategic triad, and let me just give you a little summary of our program. I am sure you are familiar, but for the committee's benefit, let me go over it.

What our program is intended to do is to maintain the usefulness of the B-52 force while laying the groundwork for increased bomber capability in the future. Our plan calls for the production of 100 B-1B's to increase our near and mid-term capability.

Senator WARNER [presiding]. Please continue. Thank you.

Dr. COOPER. Good morning, Senator Warner. If I could, I will just back up briefly and start over for your benefit. What I was in the process of doing was describing the modernization elements of the air-breathing leg; that is the purpose of the hearing today, to discuss the air-breathing leg.

Our program as we have laid it out will maintain the usefulness of the B-52 force while laying the groundwork for increased bomber capability in the future. The plan calls for the production of 100 B-1B's to increase our near and midterm capability; conversion of the B-52G and H aircraft to cruise missile carriers and conventional roles as well; retirement of the B-52D's and the employment of an advanced technology bomber to meet our future challenges and our future needs.

In addition, we are also in the processes of reengining the KC-135, at least a portion of the KC-135 fleet. We have a research and development program underway that will lead to an avionics upgrade of the FB-111, and in addition, as you well know, we have two cruise missiles—one that we are currently phasing down, the

AGM-86B, and one that is currently in development and moving toward production, the so-called advanced cruise missile.

I am pleased to report to the committee that the two-bomber program is right on track. The B-1B is on schedule and within cost and, quite frankly, we think it is looking very good. Our plan is to deploy 100 and the initial operational capability, which we think we will meet, is in 1986. Likewise, the advanced technology bomber is moving forward and we are still holding to the early 1990's IOC that we briefed this committee on last year.

Before I turn the microphone over to General Russ, I want to once again point out, Mr. Chairman, that I believe we are on a stable course in modernizing both the air-breathing and ICBM legs of the triad. We very much appreciate the strong support given to us by this committee and we look forward to your continued support of our efforts to modernize and strengthen our strategic deterrent force in the future.

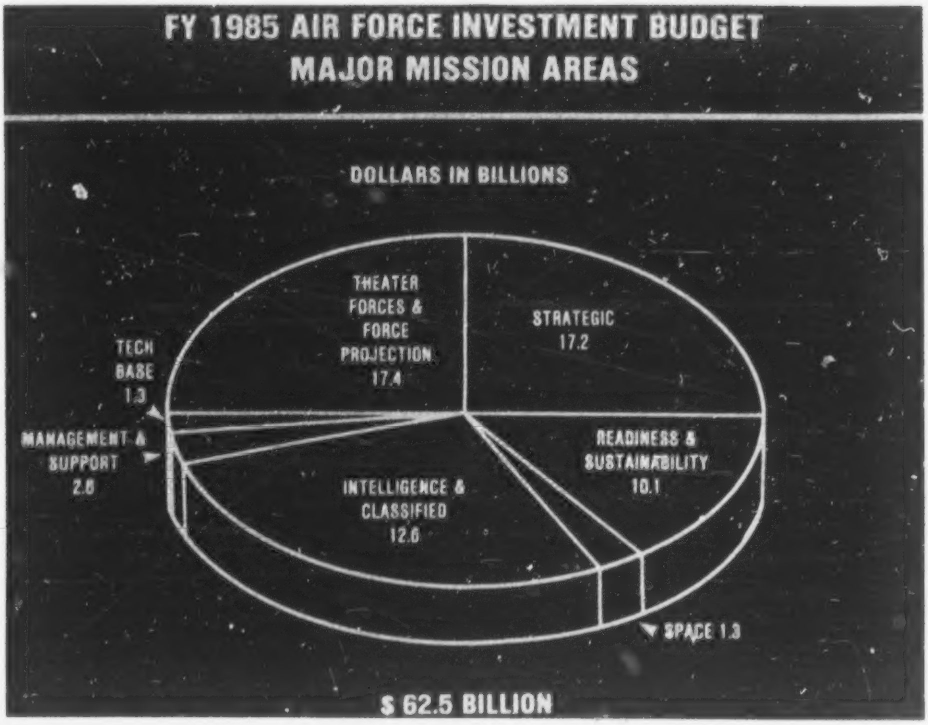
I would like to introduce once again my colleagues. On my right is Lt. Gen. Robert Russ, who is our Deputy Chief of Staff for Research, Development and Acquisition. On my far right is Maj. Gen. John Shaud, who works for General Chain, our Deputy Chief of Staff for Plans and Operations. General Shaud is Director of Plans. And on my left is Maj. Gen. Bill Gorton, who works for General Russ and is the Director for Operational Requirements.

Mr. Chairman, we did submit a statement that summarized both the air-breathing and ICBM modernization programs last time. That was submitted for the record. General Russ has a statement he would like to submit for the record. If we could do that with your concurrence, and he does have a brief overview that he would like to provide to the committee.

Senator WARNER. Without objection. Thank you.

STATEMENT OF LT. GEN. ROBERT D. RUSS, DEPUTY CHIEF OF STAFF FOR RESEARCH, DEVELOPMENT AND ACQUISITION, U.S. AIR FORCE

General RUSS. Sir, this morning I would like to just cover two or three slides to set the stage on how we propose to address the air-breathing threat in our portion of the budget.

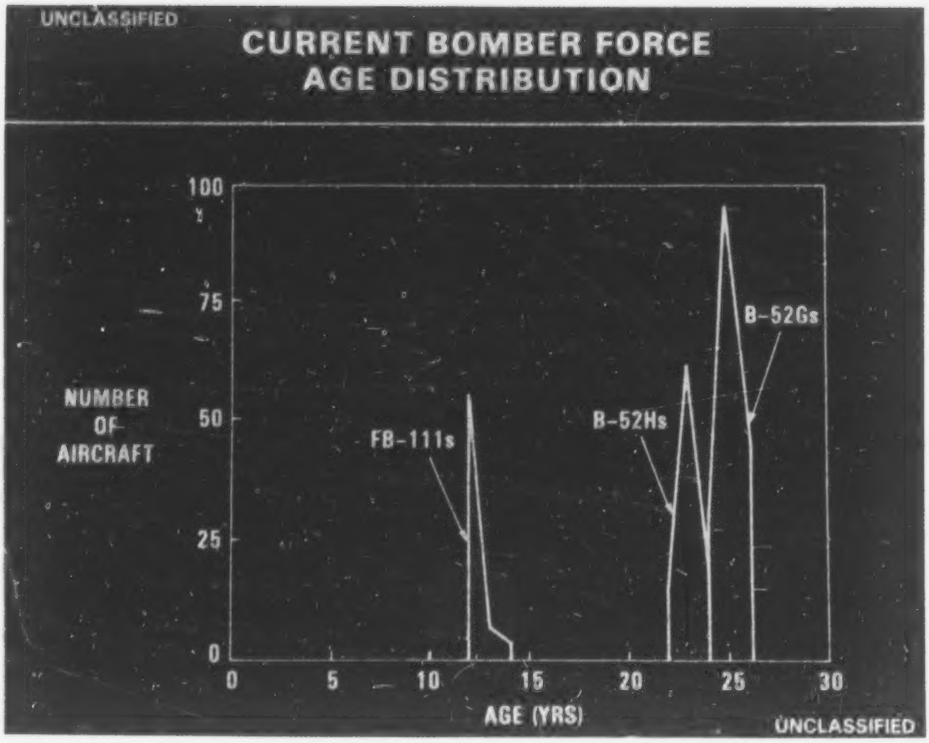


FY 1985 AIR FORCE INVESTMENT BUDGET
MAJOR MISSION AREAS

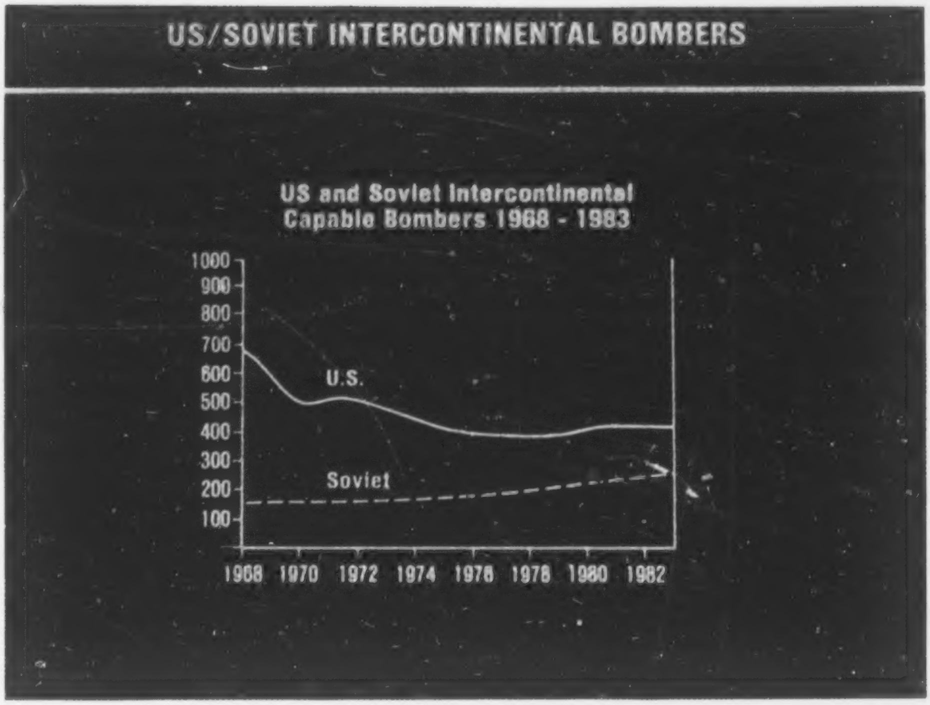
DOLLARS IN BILLIONS

$ 62.5 BILLION

You saw this slide the other day. What it does say is that we have $62.5 billion in our investment account, composed of our research, development and evaluation and also our procurement accounts. The strategic portion takes up about 25 percent of that, or $17.2 billion. Now about 50 percent of that figure, some $8.6 billion, goes for our bomber programs.



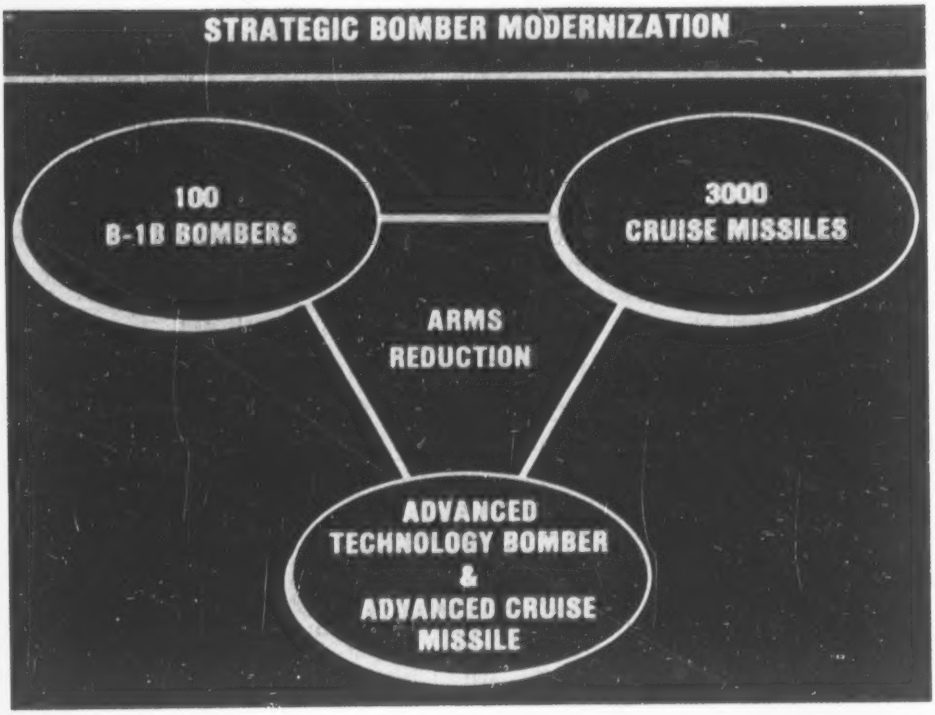
And the reason we need that money to go for our bomber programs is evident on this slide. This shows the current age of our bomber force in years, and you can see that the B-52G's and the B-52H's are out here in well over 20 years of age. As you well know, lots of them are older than the pilots that fly them.



US/SOVIET INTERCONTINENTAL BOMBERS

US and Soviet Intercontinental
Capable Bombers 1968 - 1983

If we also take a look at the total numbers of what we have, back in late 1960's period we were up well above 600 in our bomber force. Right now, we are down to the point where we are just over 300. So we have continually declined in our bomber force and the Soviets have had a somewhat gradual increase.



Senator GOLDWATER. General, I disagree with that figure. If you count the old I think it was the Bison that they were supposed to wash out when we washed out our 47's, they did not, and they are still flying them, I think they have as many aircraft in their concept of strategic air as we have.

Now they will not get over here and get back, all of them, but I have been hearing so long that we outnumber them in aircraft, but I honestly think they have as many or maybe a few more than we have.

General RUSS. Yes, sir. You know as well as I that there has always been a controversy among the intelligence community on whether they would utilize one-way missions or missions that would recover, say, in Cuba or somewhere like that. I am just giving you what the accepted intelligence viewpoint is.

You and I know there are a lot of other airplanes over there that will get to the United States and drop bombs.

Senator GOLDWATER. When we held our first hearings on Grenada in the Intelligence Committee we accepted that airport as a refueling airport for the Soviets. I just wanted to make sure we understand each other.

General RUSS. We do, sir.

Senator GOLDWATER. It will not have very much effect, because they are very, very old aircraft, but they are there.

General RUSS. What we would like to do this morning is to discuss the top two elements of this triad, I should say in the bomber program. Of course, the advanced technology bomber and the advanced cruise missile will be the subject of discussions at a later time.

I also have this morning a film clip that I would like to show a little later. I had the privilege of flying the B-1 and I have some film of that flight, and I think it would be useful to see and allow me to narrate it a little bit for you to show you what capability that airplane really has. I think that might be worthwhile for the committee.

What I would like to do now is turn it over to Bill Gorton and have him go through the individual programs, starting with the B-1 and then we will show the film after that.

[The prepared statement of General Russ follows:]

Prepared Statement of Lt. Gen. Robert D. Russ, Deputy Chief of Staff for Research, Development and Acquisition, U.S. Air Force

STRATEGIC BOMBER PROGRAMS

Mr. Chairman and members of the committee: Good morning. It is my pleasure to be here today to report on the Air Force's B-1B acquisition program. We made significant progress in 1983 towards achieving the 1986 initial operational capability for the B-1B, a key tenet of the President's strategic modernization program. The airframe, engine, and avionics developments have proceeded very well, staying on or ahead of schedule. As for procurement, with the help of the Congress, the Air Force has made important strides towards being able to deliver a major new weapon system on schedule and on cost. Your approval of multiyear procurement for the B-1B now enables us to achieve the $20.5 billion program certified by President Reagan. We expect B-1B number one to roll out in September, over six months ahead of schedule, a notable accomplishment that reflects true Congressional, Air Force, and industry commitment to insuring this nation's defenses remain strong.

In supporting the President's programs, Congress has directed that it be provided information with which to monitor the modernization and arms control efforts and to make informed decisions in the future. Attached is a summary of congressional reporting requirements and action taken to date to comply with those requirements.

REPORT OF COMPLIANCE WITH CONGRESSIONAL B-1B INFORMATION REQUESTS

Requirement (1)

Section 1240, FY 84 DOD Authorization Act, requires the Secretary of Defense to conduct a detailed financial analysis on the projected cost of procuring 100 B-1B bomber aircraft. On the basis of that analysis, he is to revise as necessary the total projected cost estimate certified by the President in January 1982. A written report of the analysis must be submitted to the Congress not more than 60 days after the enactment of the FY 1984 DOD Appropriations Act, but in no event later than January 1984. The Secretary is to include a new estimate of the projected total cost for the procurement of 100 B-1B aircraft. A copy of the report must be transmitted to the Comptroller General of the United States for his review.

Action (1)

At the direction of the Secretary of Defense, the Department of the Air Force conducted the detailed B-1B financial analysis during the Fall of 1983. After reviewing its findings, the Secretary submitted a written report to Congress on 31 January 1984 recertifying the B-1B program budget estimate of $20.5 billion (FY 1981 $). A copy of the report was sent to the Comptroller General.

Requirement (2)

The House Appropriations Committee Report (9 Jun 83), accompanying the FY 84 DOD Appropriations Bill requires the Air Force to submit a full B-1 basing plan. The plan must identify the location of all Air Force bases that are to receive B-1 beddowns, the military construction costs involved, and statistics justifying planned expenditures. Additional B-1 beddown construction beyond Dyess AFB, Texas will not be approved until the report is submitted (page 41).

Action (2)

The complete list of bases for the B-1B beddown was announced by the Air Force on 1 February 1984. An explanation of the total cost involved with each beddown base will be supplied to the House Appropriations Committee Military Construction Subcommittee.

Requirement (3)

The Senate Armed Services Committee Report (Report No. 98-174) accompanying the FY 1984 DOD Authorization Bill requests the Secretary of the Air Force to report back to the Committee prior to commiting funds for procurement of B-1B ALCM loaders. The committee seeks a full explanation of the rational behind a sole source acquisition of B-1 loaders derived from the B-52 ALCM loaders, with an assessment of the merits of that approach compared with the operational, maintenance, and cost factors which might attend a competitive design and procurement of these systems (page 96).

Action (3)

After reviewing its munitions loader acquisition program, the Air Force reported back to Congress that it intended to take two actions. It plans to adapt the loader currently in the inventory in order to meet the B-1B initial operational capability, and it will seek competitive designs for a simplified loader. Upon Congressional notification, the Air Force will release requests for proposal for alternative loader designs.

Requirement (4)

The Senate Approriations committee Report (Report No 98-292) accompanying the FY 84 DOD Appropriations Bill requires the Air Force to inform the Committee on the negotiation progress and results of multiyear contracts.

Action (4)

In a 30 December 1983 letter to the Chairman of the House Appropriations Committee, the Assistant Secretary of the Air Force for Financial Management provided information on the planned schedule for receipt of updated proposals and completion of negotiations. Pertinent data on negotiated prices will be supplied as they become available.

Requirement (5)

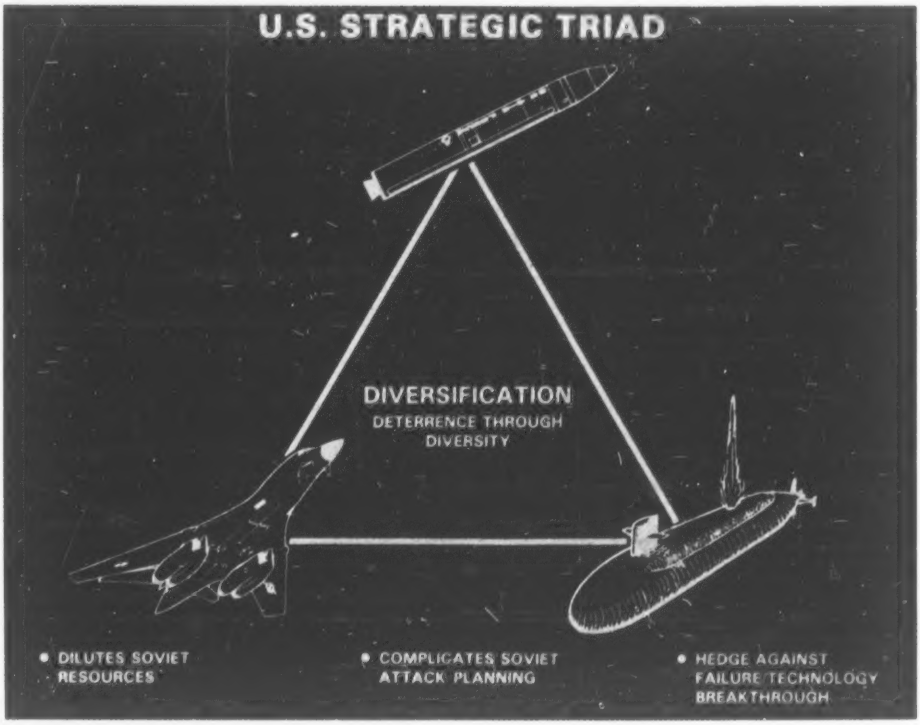
The Appropriation Conference Committee Report (Report No. 98-567) requires the Secretary of the Air Force to submit multiyear proposals at the time of contract award reflecting the actual contract details.

Action (5)

After contract approval, but prior to actual distribution of the contract, the Secretary of the Air Force will submit a letter to Congress providing the information requested.

STATEMENT OF MAJ. GEN. WILLIAM A. GORTON, USAF, DIRECTOR OF OPERATIONAL REQUIREMENTS AND DEPUTY CHIEF OF STAFF FOR RESEARCH, DEVELOPMENT, AND ACQUISITION

General GORTON. It is a pleasure, Mr. Chairman, to have the opportunity to discuss the air-breathing element of the strategic triad.



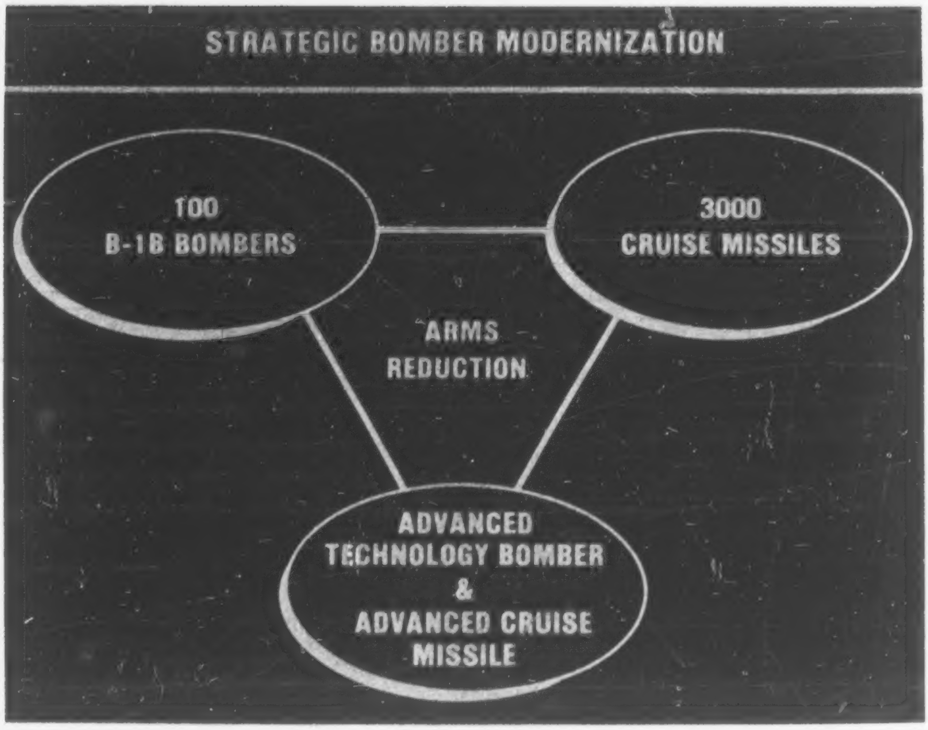
U.S. STRATEGIC TRIAD

DIVERSIFICATION

DETERRENCE THROUGH DIVERSITY

- DILUTES SOVIET RESOURCES
- COMPLICATES SOVIET ATTACK PLANNING
- HEDGE AGAINST FAILURE/TECHNOLOGY BREAKTHROUGH

As General Russ pointed out, we will be focusing on that strategic bomber force and the other elements within that force that make up the air-breathing side of the triad.



STRATEGIC BOMBER MODERNIZATION

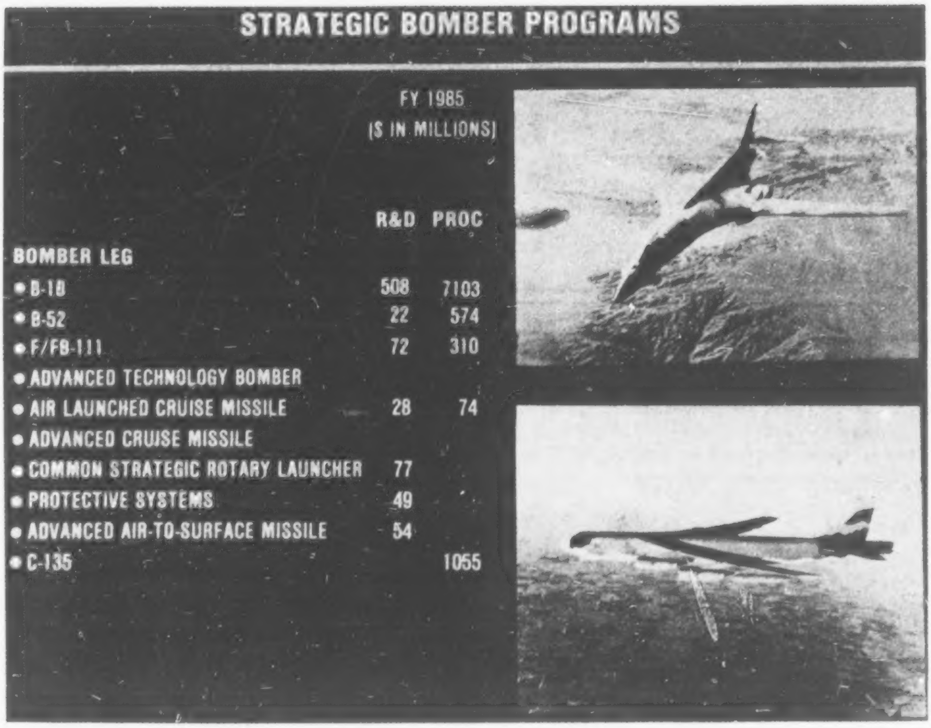
100
B-1B BOMBERS

3000
CRUISE MISSILES

ARMS
REDUCTION

ADVANCED
TECHNOLOGY BOMBER
&
ADVANCED CRUISE
MISSILE

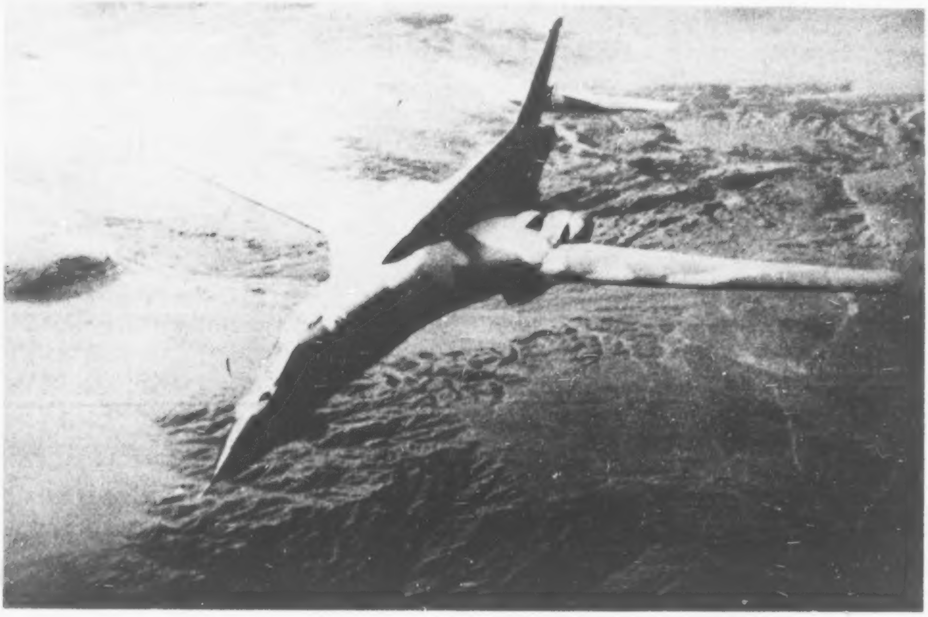
We will cover the bombers and the cruise missile area.



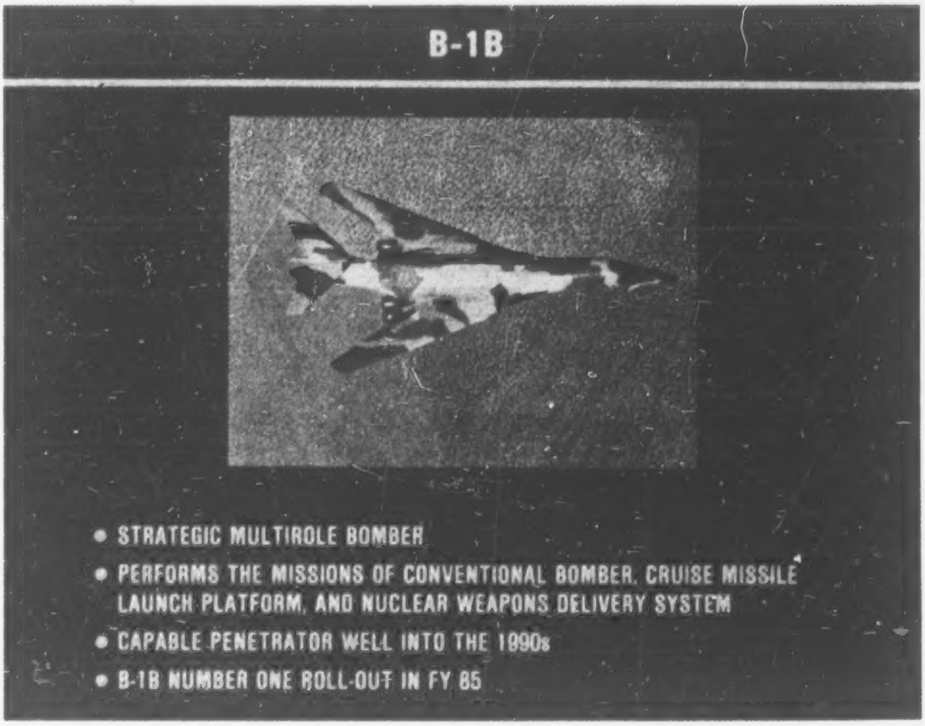
STRATEGIC BOMBER PROGRAMS

	FY 1985 ($ IN MILLIONS) R&D	FY 1985 ($ IN MILLIONS) PROC
BOMBER LEG		
• B-1B	508	7103
• B-52	22	574
• F/FB-111	72	310
• ADVANCED TECHNOLOGY BOMBER		
• AIR LAUNCHED CRUISE MISSILE	28	74
• ADVANCED CRUISE MISSILE		
• COMMON STRATEGIC ROTARY LAUNCHER	77	
• PROTECTIVE SYSTEMS	49	
• ADVANCED AIR-TO-SURFACE MISSILE	54	
• C-135		1055

We will start off with a brief overview of what we will start with and cover here today. The B-1. We will be looking at both R&D and procurement on all of these programs.



Starting off with the B–1, this is a picture of the B–1, one of the B–1 test aircraft.



B-1B

- STRATEGIC MULTIROLE BOMBER
- PERFORMS THE MISSIONS OF CONVENTIONAL BOMBER, CRUISE MISSILE LAUNCH PLATFORM, AND NUCLEAR WEAPONS DELIVERY SYSTEM
- CAPABLE PENETRATOR WELL INTO THE 1990s
- B-1B NUMBER ONE ROLL-OUT IN FY 85

As you are very familiar with, the B–1 is a multipurpose aircraft designed to be able to penetrate the Soviet defenses well into the 1990's and we are, as Dr. Cooper mentioned, proud of the program. At this stage we are very much on schedule and on cost.

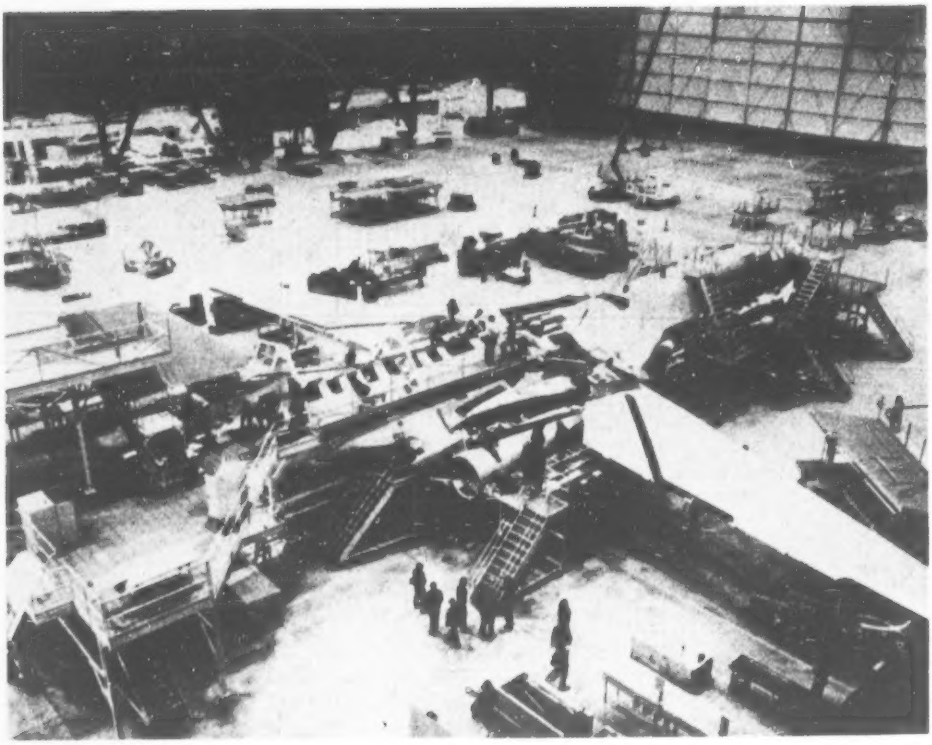
You will note at the bottom of the slide we reflect that the first B–1B is contracted to fly in 1985. In fact, the first B–1B will roll out in September of this year and will fly before the end of the year. So that gives an indication at least with regard to the first aircraft as to our performance on schedule.

Senator Goldwater. What will be the rollout schedule?

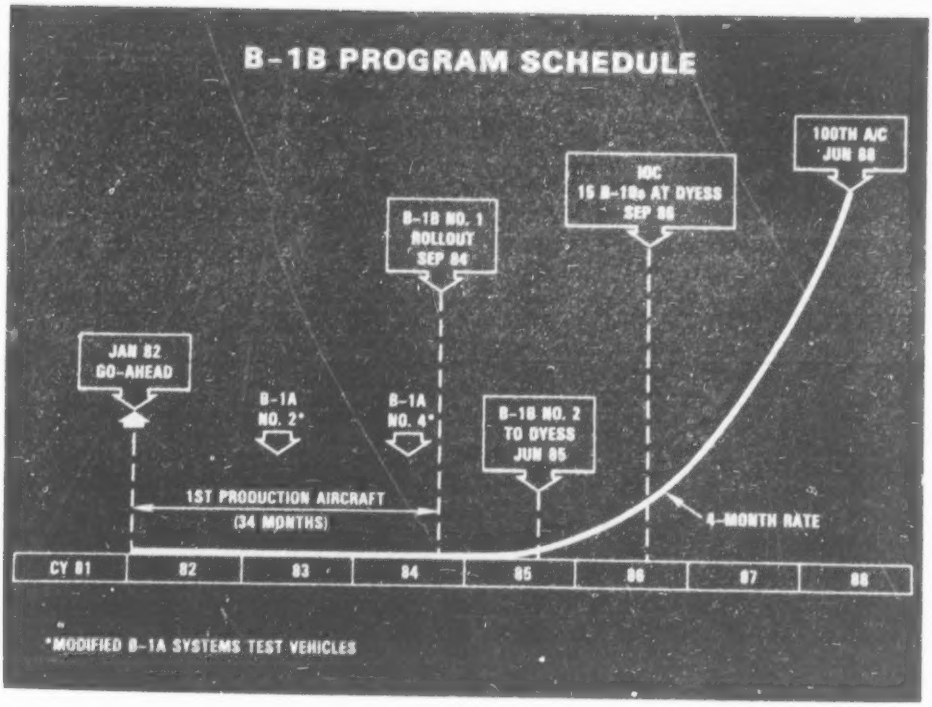
General Gorton. Sir?

Senator Goldwater. What will be the rate of rollout?

General Gorton. I will show you that on the very next slide, sir.



First, this is the aircraft we are talking about—the first B-1B. It is at Palmdale right now. This picture was taken about 10 days ago. All the major components are on the aircraft. At this stage of the game they are just beginning to install the engines. It is moving right along.

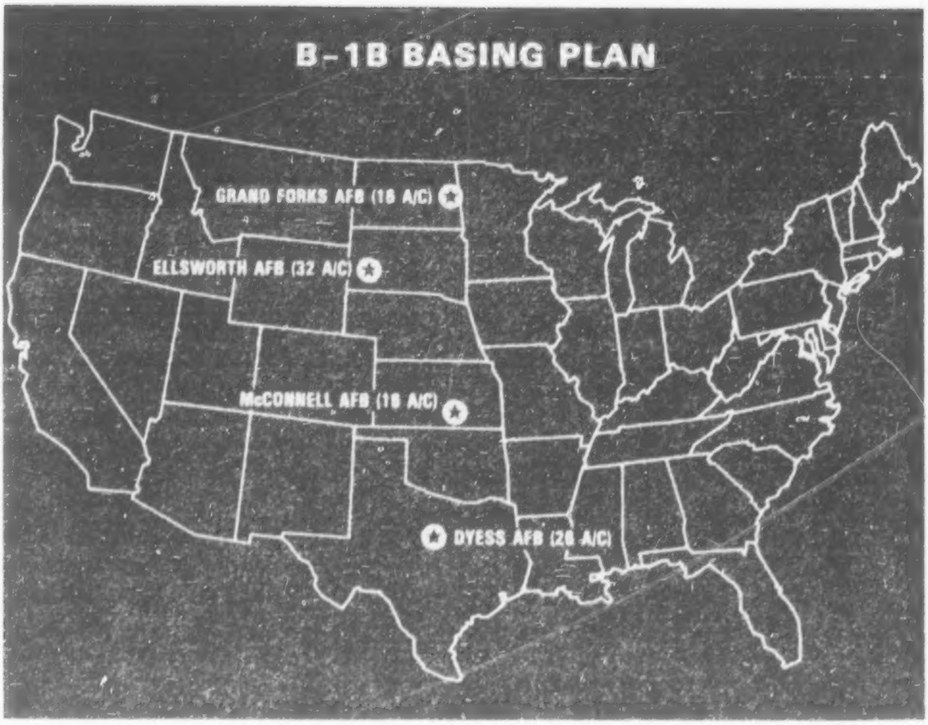


Here, in answer to your question, Senator Goldwater, is a picture of the whole program laid out with major milestones. We got the January 1982 go-ahead and our first production aricraft will actually roll out in September 1984, 32 months after the go-ahead. So that is moving along very well.

We have got B--1A No. 2 in the test program right now, flying out of Edwards. B-1A No. 4 modified, will be joining that test flight program by about July of this year. We will be using B--1B No. 1 in the test program for a while. It will eventually move to SAC.

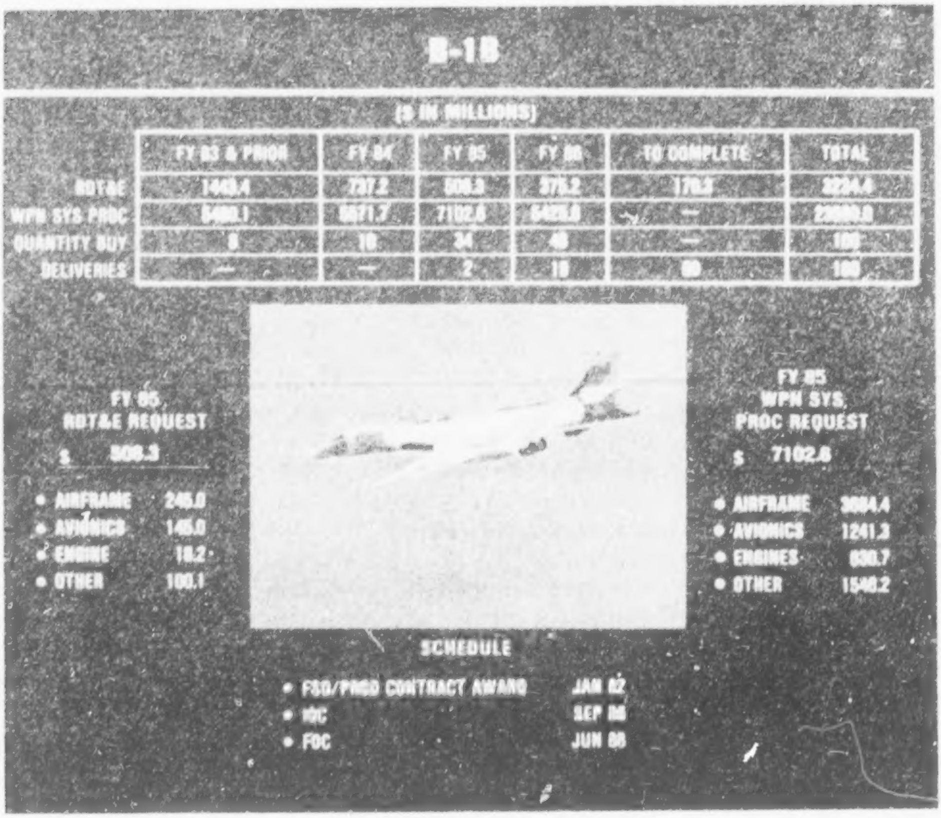
The first B-1B to arrive at Dyess Air Force Base, which is the first operational base and the training base for the B-1, will be in the June 1985 timeframe, and then will achieve an IOC at Dyess in September of 1986.

And as you can see, Senator Goldwater, in answer to your question, the rate moves up very quickly. It is a compressed program, as it was scheduled to be, achieving a rate of four per month in the 1986 timeframe, with completion, delivery of the 100th aircraft, in June of 1988 for a full operational capability (FOC).


B-1B BASING PLAN
GRAND FORKS AFB (16 A/C)
ELLSWORTH AFB (32 A/C)
McCONNELL AFB (16 A/C)
DYESS AFB (26 A/C)

As you may recall, on the first of February we announced all four bases which will be the operational bases for the B-1. They are shown here—Dyess; Grand Forks; Ellsworth, which will have two squadrons; and McConnell Air Force Base. Dyess will also have the training unit as well as an operational squadron.

As you can see, the way they are arrayed in the center part of the United States, they were selected for that strategic purpose, to provide a maximum amount of warning from the SLBM threat on either coast.



B-1B

($ IN MILLIONS)

	FY 83 & PRIOR	FY 84	FY 85	FY 86	TO COMPLETE	TOTAL
RDT&E	1443.4	737.2	508.3	375.2	170.8	2234.4
WPN SYS PROC	5480.1	6571.7	7102.6	6425.0	—	25580.0
QUANTITY BUY	8	10	34	48	—	100
DELIVERIES	—	—	2	18	80	100

FY 85
RDT&E REQUEST
$ 508.3

- AIRFRAME 245.0
- AVIONICS 145.0
- ENGINE 18.2
- OTHER 100.1

FY 85
WPN SYS
PROC REQUEST
$ 7102.6

- AIRFRAME 3684.4
- AVIONICS 1241.3
- ENGINES 630.7
- OTHER 1546.2

SCHEDULE

- FSD/PROD CONTRACT AWARD JAN 82
- IOC SEP 86
- FOC JUN 88

We will start on the program now. With your permission, we will look at the RDT&E first and then we will look at procurement.

Basically, as you can see, the RDT&E is beginning to scale down. We are coming to the end of the program. As I said, it is a very tight program and basically the RDT&E effort, the major portion of it, will be devoted to the test flight effort, which is increasing. We will be adding the second test bird out there in July of this year, and also with regard to cruise missile integration.

With regard to the procurement, major procurement is beginning to ramp up very steeply in order to bring the aircraft into the inventory. As we indicated, we will be proposing a request for 34 aircraft this year and the final request for the 48 aircraft will be next year, fiscal year 1986, and that will complete the program of 100.

In general terms, the Congress has authorized in the 1984 authorization a number of initiatives in this program to assure that we will maintain the cost as certified by the President to the Congress of $20.5 billion in fiscal year 1981 dollars.

We have taken a number of initiatives within the program. The system program office and the contractors are working hard at produceability efforts to reduce cost and, of course, the major two items that are involved in keeping this cost within the $20.5 billion are the multiyear contracts, both for spares and for the four major associate contractors.

We have received three of the four responses to our requests for proposals on multiyear. We are evaluating the General Electric one and coming to the conclusion of those negotiations. We hope to conclude those negotiations by the end of the month. I cannot say at this stage as to the precise end game and what the dollar value will be of that negotiated contract. However, I can say that they have come in with proposals that certainly meet what we expected and actually are a little bit better than what we expected in terms of savings on the GE contract.

I should point out, however, that the major contract is with Rockwell and it represents 60 to 70 percent of the anticipated multiyear savings. That proposal has not been presented to us. It will be presented to us later on this month and we will be entering negotiations on that contract at that time, the point being that the initial contract we have looked at has come in a little bit over what we anticipated as far as the cost savings to be accrued with multiyear.

So we are confident, reasonably confident, that we will be able to maintain the total program at the $20.5 billion certified by the President to the Congress.

So that is a very brief overview of the program that we are very pleased with, and it is progressing very well.

Senator WARNER. Would you provide for the record a list of the subs—the subcontractors?

General GORTON. Yes, I certainly can. There are a number of them, as you well know. We can provide that.

[The information follows:]

B-1 MULTIYEAR CONTRACT

The Air Force will have multiyear procurement contracts with four associate contractors. Those contractors have well over 5,000 subcontractors, suppliers, and vendors working for them. The following list only includes the major subcontractors for the associate contractors.

ROCKWELL

Aeronca
AirResearch
AVCO
Bendix
Brunswick
Cleveland
Crane Co.
Garrett
General Electric
Goodrich
Goodyear
Hamilton Standard
Harris Corporation
Hughes-Treitler
Kaman
Martin Marietta
McDonnell Douglas
Menasco
Sieracin/Sylmar
Swedlow
Simmonds
Singer Kearfoot
SPECO Division
Sperry Corporation
Sperry Vickers
SSP Industries
Sterer Engineering
Sundstrand
Telephonics
TRW
United Aircraft Products
Vought
Westinghouse Electrical Corporation
Autonetics

GENERAL ELECTRIC

Woodward Governoir
Parker Hannifin
United Nuclear
CHEM-TRONICS
Heintz
Western Gear

AIL

Northrup
SEDCO
Raytheon

BOEING

Sanders Associates
Sperry Flight
Sundstrand
Data Control
Singer-Kearfott
Teledyne-Ryan
Westinghouse
IBM

Senator **Warner**. What are the first six or eight principal ones?

General **Gorton**. Well, there are four associate contractors. There is Rockwell. There is GE for the engines, AIL for the defensive ECM suite, and Boeing.

Senator **Warner**. And LTV comes in.

General **Gorton**. And LTV makes the major wing box and makes a large component. AVCO makes large components. There are, as you are well aware, a large number of subcontractors that are affiliated with the four associates.

Senator **Warner**. Just to determine some bottom line which is reasonable.

Dr. **Cooper**. As I am sure you are well aware, Senator, if you go down to the second and third level vendors there are several thousand companies that are involved in the program.

Senator **Warner**. Without drawing a diagram, you know what I need.

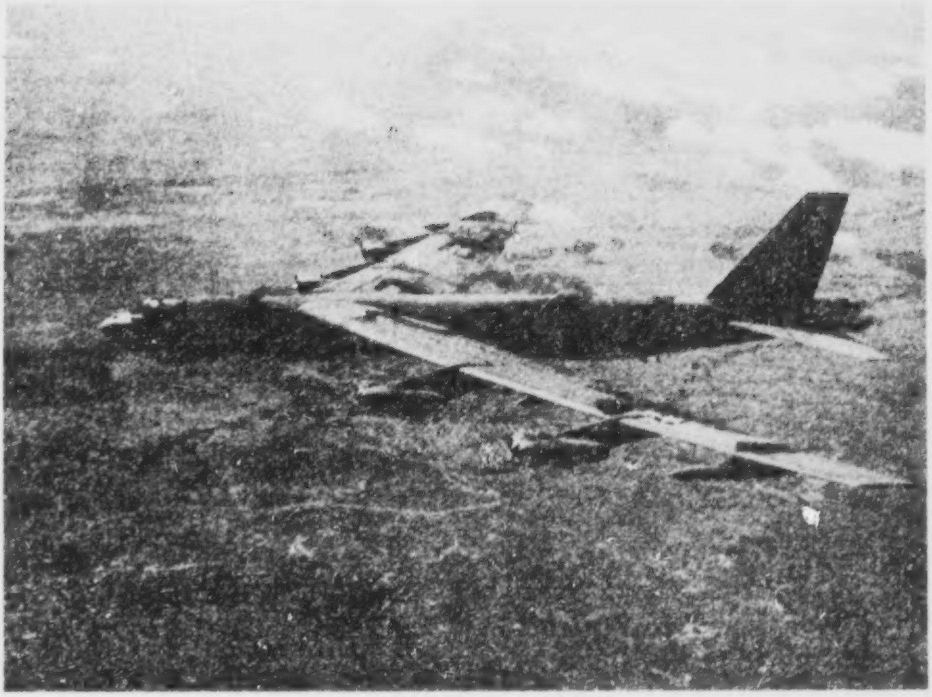
Dr. **Cooper**. Absolutely.

Senator **Goldwater**. In every State in the Union.

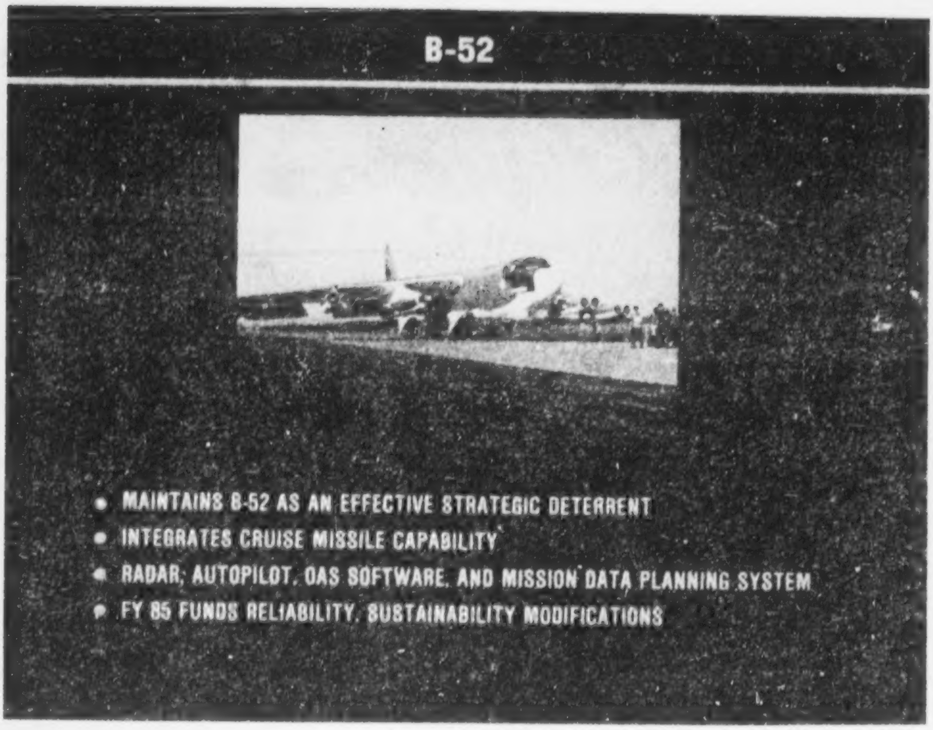
General **Gorton**. Close to it, sir.

B-52 PROGRAM

Sir, if there are no further questions on the B-1, we will take a look at the B-52 modernization and modification program.



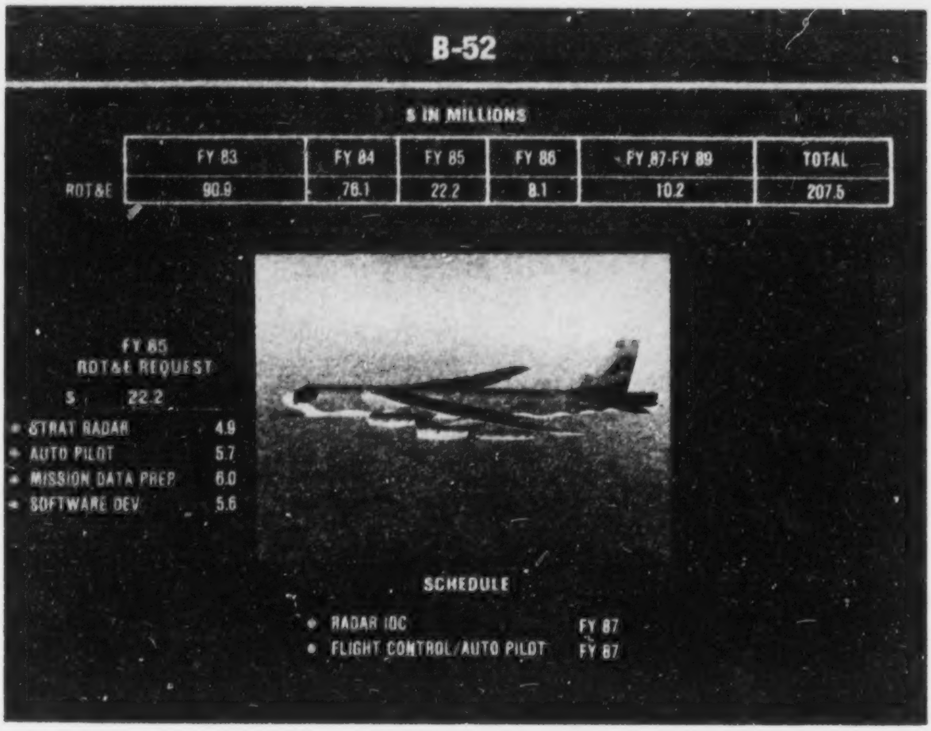
As you know, the B-52 is the main aircraft we have in the strategic air-breathing force today.



B-52

- MAINTAINS B-52 AS AN EFFECTIVE STRATEGIC DETERRENT
- INTEGRATES CRUISE MISSILE CAPABILITY
- RADAR, AUTOPILOT, OAS SOFTWARE, AND MISSION DATA PLANNING SYSTEM
- FY 85 FUNDS RELIABILITY, SUSTAINABILITY MODIFICATIONS

There are a number of programs ongoing with the B–52 basically associated with two major thrusts—to upgrade the capability to the B–52 for internal and external carriage of cruise missiles, and then maintainability and reliability updates to rather old components that have caused us significant problems in maintaining the levels of readiness we wish and desire.



B-52

$ IN MILLIONS

	FY 83	FY 84	FY 85	FY 86	FY 87-FY 89	TOTAL
RDT&E	90.9	76.1	22.2	8.1	10.2	207.5

FY 85
RDT&E REQUEST

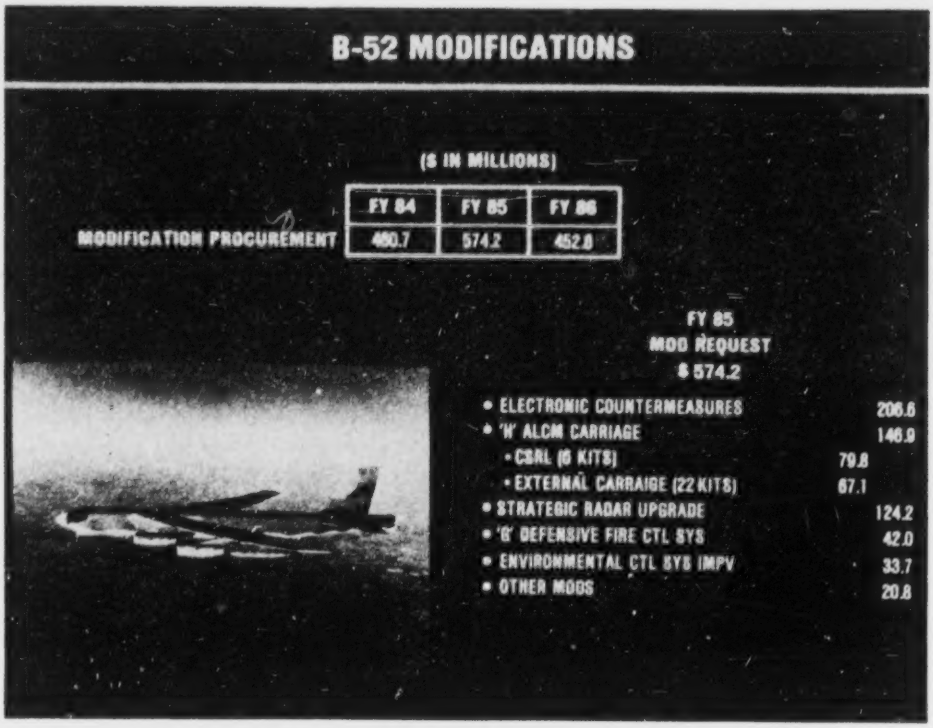
$	22.2
• STRAT RADAR	4.9
• AUTO PILOT	5.7
• MISSION DATA PREP	6.0
• SOFTWARE DEV	5.6

SCHEDULE

• RADAR IOC	FY 87
• FLIGHT CONTROL/AUTO PILOT	FY 87

If we look at the RDT&E on the B–52's, the small efforts, sloping down fairly dramatically at this stage. Major effort in RDT&E is the software, minor efforts in strategic radar upgrades, and some mission data preparations that are associated with both the cruise missiles and the recent upgrade in OAS to the aircraft. That is to allow us to better mission plan, and some minor efforts in software development.

With regard to the major effort on the B–52, it is in the modification program.



B-52 MODIFICATIONS

($ IN MILLIONS)

	FY 84	FY 85	FY 86
MODIFICATION PROCUREMENT	480.7	574.2	452.0

FY 85
MOD REQUEST
$ 574.2

• ELECTRONIC COUNTERMEASURES		206.6
• 'H' ALCM CARRIAGE		146.9
• CSRL (6 KITS)	79.8	
• EXTERNAL CARRAIGE (22 KITS)	67.1	
• STRATEGIC RADAR UPGRADE		124.2
• 'G' DEFENSIVE FIRE CTL SYS		42.0
• ENVIRONMENTAL CTL SYS IMPV		33.7
• OTHER MODS		20.8

Our request for procurement dollars in that account is $574 million this year. There are a number of major programs going on. The electronic countermeasures effort is relegated to two principal programs and a number of smaller ones.

The upgrade of the ALQ-117 on our B-52G's and the ALQ-172 for the B-52H's. These are upgrades of our current electronic countermeasures set in order to deal with the increasing Soviet air-to-air threat in particular.

Senator GOLDWATER. Does that include the external on the right side of the fuselage—part of the fire control system?

General GORTON. Yes; with regard to the G models, we are upgrading the fire control system on the G models because of its rather very poor performance in terms of maintainability and reliability, approximately 6 hours mean time between failure. We will be upgrading that to 100 hours mean time between failure.

Senator GOLDWATER. The one that I flew in had the ability to look through. If you were coming up on a number of oil tankers it would tell you how much oil was in one, which one was empty and so forth.

General GORTON. That was the FLIR. You can tell which one had oil in it by virtue of whether it was warm or cold.

Senator GOLDWATER. That is included in your new modifications?

General GORTON. Yes; we are doing some minor modification to the FLIR.

As I said, a major portion of our effort today is in upgrading the B-52 for cruise missile carriage, and basically, as you recall, the Congress denied the $145 million for CSRL—that is the Common

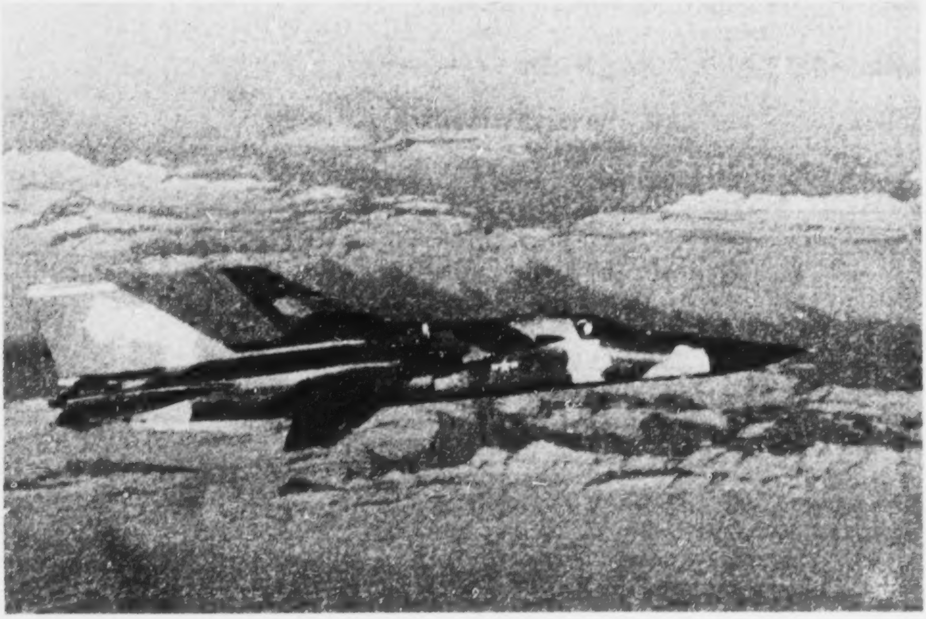
Strategic Rotary Launcher—that has now been requested in this year.

We have one kit. We will be purchasing six more within this procurement account and they will be installed in the B-52H. The CSRL will be discussed briefly later on. I should point out that the procurement for CSRL's are in the mod account; the RDT&E components are in a separate account and I will show you those later in the briefing.

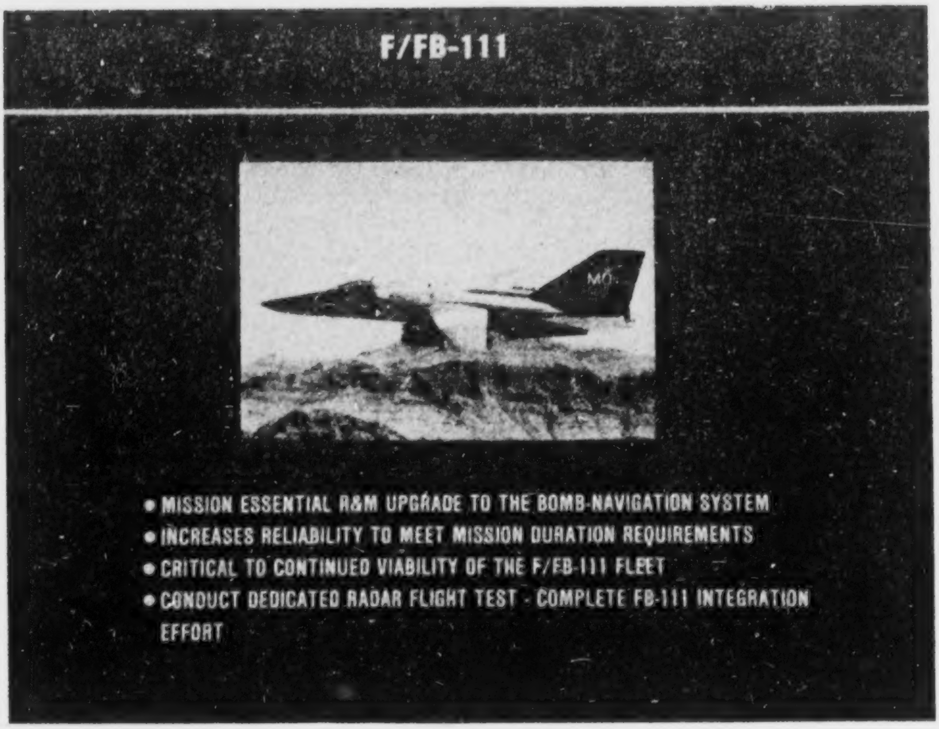
The strategic radar upgrade is a significant upgrade based on maintainability and reliability. Presently that is the largest single contributor to the lack of readiness. About 20 percent of nonready factor is devoted to that system alone and presently we are increasing that in the neighborhood of about 19 hours mean time between failure, a relatively low area right now.

And the other mods are basically maintainability and reliability. That completes the B-52 mod programs.

F-111



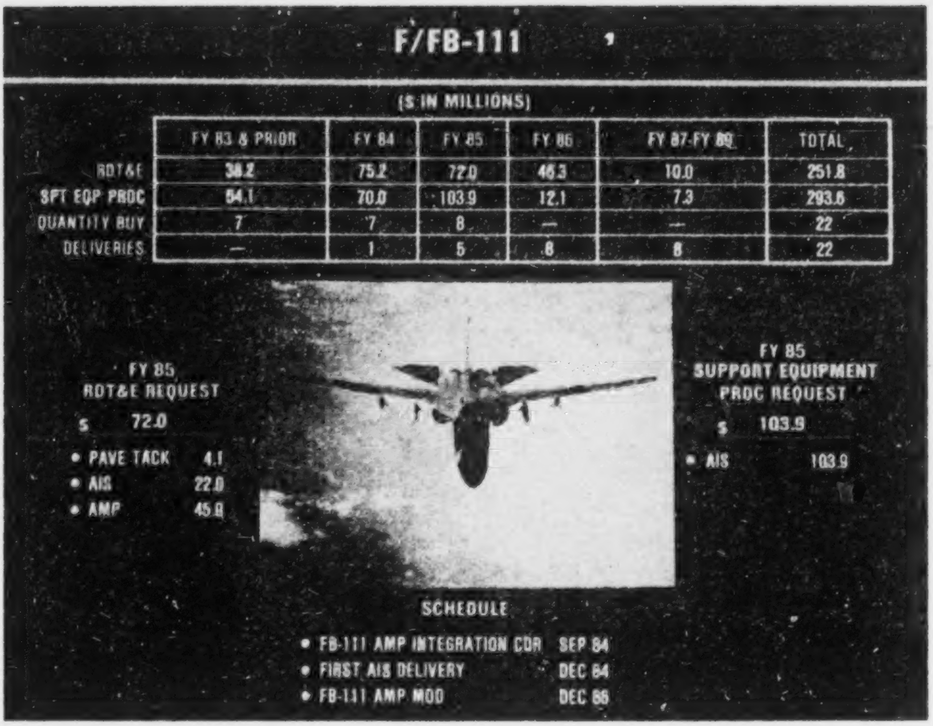
The F-111. We will be looking at the FB-111. In that portion of the strategic air-breathing force there are a number of things that are going on within these accounts, along the whole F-111 fleet—the FB as well as the tactical fighters.



F/FB-111

- MISSION ESSENTIAL R&M UPGRADE TO THE BOMB-NAVIGATION SYSTEM
- INCREASES RELIABILITY TO MEET MISSION DURATION REQUIREMENTS
- CRITICAL TO CONTINUED VIABILITY OF THE F/FB-111 FLEET
- CONDUCT DEDICATED RADAR FLIGHT TEST - COMPLETE FB-111 INTEGRATION EFFORT

The FB-111 is a superb airplane, a very good penetrator and we are doing upgrades for maintainability and reliability, particularly in the bomb-nav system, which has been a significant contributor to the maintenance effort and had an adverse impact on readiness.



F/FB-111

($ IN MILLIONS)

	FY 83 & PRIOR	FY 84	FY 85	FY 86	FY 87-FY 89	TOTAL
RDT&E	38.2	75.2	72.0	46.3	10.0	251.8
SPT EQP PROC	54.1	70.0	103.9	12.1	7.3	293.6
QUANTITY BUY	7	7	8	—	—	22
DELIVERIES	—	1	5	8	8	22

FY 85
RDT&E REQUEST
$ 72.0

• PAVE TACK	4.1
• AIS	22.0
• AMP	45.9

FY 85
SUPPORT EQUIPMENT
PROC REQUEST
$ 103.9

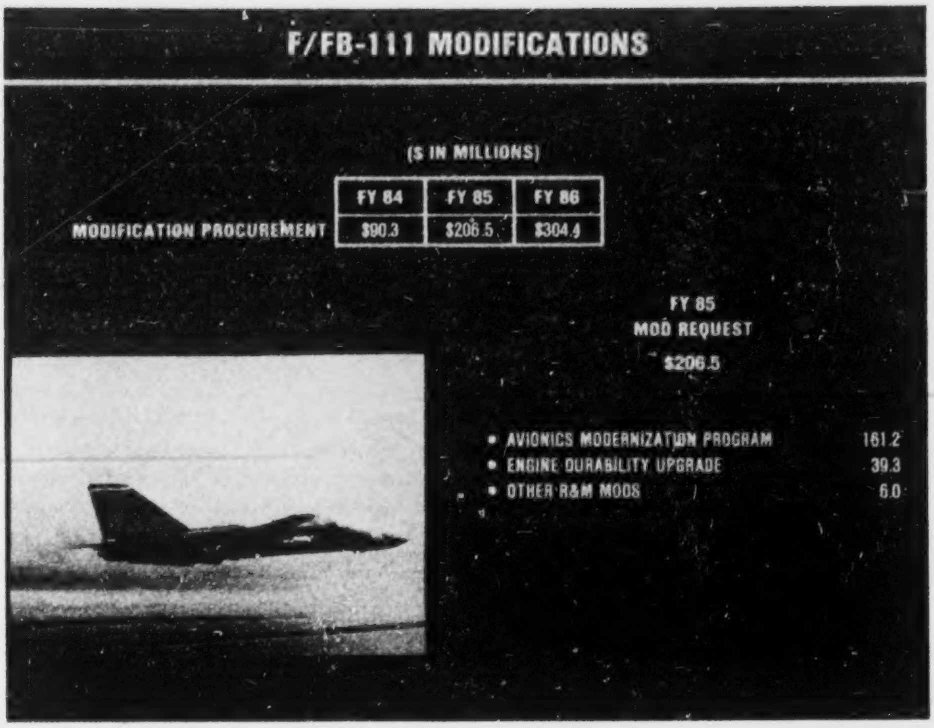
• AIS	103.9

SCHEDULE

• FB-111 AMP INTEGRATION CDR	SEP 84
• FIRST AIS DELIVERY	DEC 84
• FB-111 AMP MOD	DEC 86

We are asking in RDT&E for $72.0 million and that is basically associated with a minor bit of work on the tactical aircraft and their FLIR system, a major bit of RDT&E work on a maintenance test station to support the equipment that we are modernizing the bomb-nav system with, and the bomb-nav system RDT&E is shown here.

As far as the procurement in this particular account it is for the AIS, avionics shop test equipment.



F/FB-111 MODIFICATIONS

($ IN MILLIONS)

	FY 84	FY 85	FY 86
MODIFICATION PROCUREMENT	$90.3	$206.5	$304.4

FY 85
MOD REQUEST
$206.5

• AVIONICS MODERNIZATION PROGRAM	161.2
• ENGINE DURABILITY UPGRADE	39.3
• OTHER R&M MODS	6.0

Senator GOLDWATER. How many of the electronic 111's are we going to put into the inventory?

General GORTON. Those are the EF-111's, sir, going into Mountain Home AFB right now. In fact, we have an operational squadron that is over on the tactical side. I think it is in the neighborhood of——

Dr. COOPER. It is 42, Senator, that is the total.

Senator GOLDWATER. Forty-two?

Dr. COOPER. Forty-two airframes is what we have modified with the ALQ-199.

Senator GOLDWATER. How many do you have now?

General RUSS. Sir, we have an operational squadron at Mountain Home, and the first one you are thinking about I am sure you saw in the paper the other day. The first one arrived in Europe, so we are getting our first ones into the theater at this time.

General GORTON. With regard to the modification account on the FB-111, this includes both F's and FB's. The major factor in this procurement account is for the avionics modernization program.

At the present time it is the highest priority of the Strategic Air Command. They are confronted with a situation where we have about a 1.6-hour mean time between failure on the bomb-nav system of the F-111 and the average strategic mission lasts about 10 hours. It is an essential modification for maintainability and reliability and does provide us a better INS accuracy.

Senator WARNER. What happened to the old system that resulted in that high mean time between failure rate?

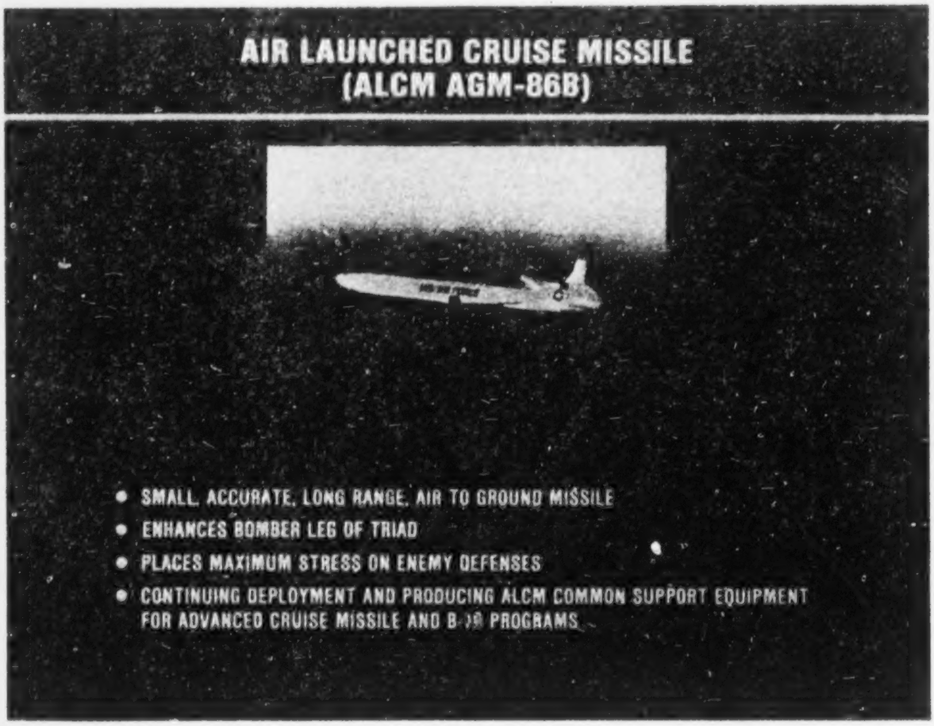
General GORTON. It is a fairly complex system. It is relatively old in terms of its technology. I think it is a question of the total individual components of the system for its time were very good together Today, compared to what is available in the really burgeoning area of technology, particularly in computers, that has occurred over that period, it provides us an outstanding maintainability and reliability factor and it makes it very valuable to support and field that particular technology.

Dr. COOPER. Much of it is tube technology. Time has passed it by.

Senator WARNER. Really.

General GORTON. And that is the total program for the F-111.

We will now move into the ALCM-B cruise missile, a picture of it in flight.



AIR LAUNCHED CRUISE MISSILE
(ALCM AGM-86B)

- SMALL, ACCURATE, LONG RANGE, AIR TO GROUND MISSILE
- ENHANCES BOMBER LEG OF TRIAD
- PLACES MAXIMUM STRESS ON ENEMY DEFENSES
- CONTINUING DEPLOYMENT AND PRODUCING ALCM COMMON SUPPORT EQUIPMENT FOR ADVANCED CRUISE MISSILE AND B-1B PROGRAMS

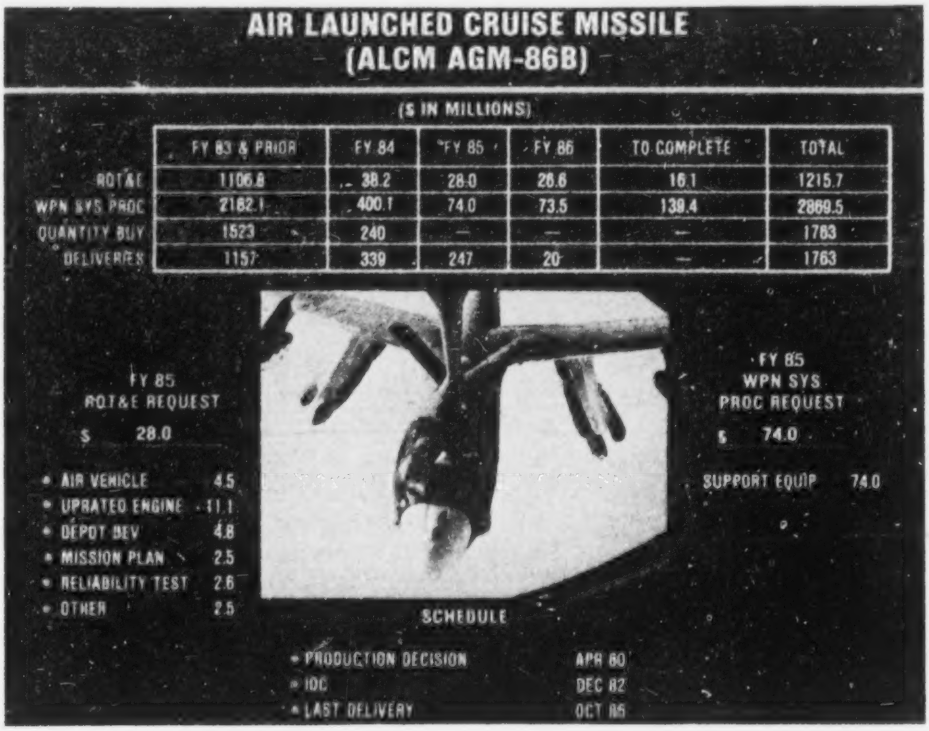
Senator WARNER. What is the length of that, just to give us some idea?

Dr. COOPER. It is about 240 inches, I think, in that ballpark, Senator, around 20 feet long. I think it is on the order of, what, 3,000 pounds? Those are the rough dimensions of it, at any rate, to give you a feel for it.

General RUSS. 20.75 feet long and 27.3 inches in diameter, and weighs 3,144 pounds.

Dr. COOPER. Not bad.

General GORTON. With regard to the ALCM, we are looking at the ALCM-B here. The capabilities of the ALCM are shown here. It makes a tremendous increase in enhancing our air-breathing leg, particularly in the penetration role. The Soviet defense against penetrators is significantly complex. It flies fast, low and has a relatively low signature. We have completed the procurement on the ALCM-B. This procurement was completed last year.



AIR LAUNCHED CRUISE MISSILE (ALCM AGM-86B)

($ IN MILLIONS)

	FY 83 & PRIOR	FY 84	FY 85	FY 86	TO COMPLETE	TOTAL
RDT&E	1106.8	38.2	28.0	28.6	16.1	1215.7
WPN SYS PROC	2182.1	400.1	74.0	73.5	139.4	2869.5
QUANTITY BUY	1523	240	—	—	—	1763
DELIVERIES	1157	339	247	20	—	1763

FY 85
RDT&E REQUEST
$ 28.0

AIR VEHICLE	4.5
UPRATED ENGINE	11.1
DEPOT DEV	4.8
MISSION PLAN	2.5
RELIABILITY TEST	2.6
OTHER	2.5

FY 85
WPN SYS
PROC REQUEST
$ 74.0

SUPPORT EQUIP 74.0

SCHEDULE

PRODUCTION DECISION	APR 80
IOC	DEC 82
LAST DELIVERY	OCT 85

As you recall, the Congress added procurement dollars for an additional 240 to coincide with, and I might point out that this whole program is interwoven and dovetailed with, the procurement and development of the advanced cruise missile.

So while we are not asking for any procurement in this particular budget year it is rammed through. The ACM program is focused in on this, and there will be development and procurement of ACM in that general timeframe.

RDT&E is at a relatively low level as far as the ALCM itself. We are beginning to slow down and terminate, but not totally terminate, but reduce it down to an operational level basically on the air vehicle a limited amount, a major change in seeing if we cannot upgrade the engine on the ALCM-B to provide a little bit better performance, and a number of other minor RDT&E efforts.

The basic support procurement. A limited amount for support equipment. That is basically for trailers and some maintenance test equipment that will be common not only to the ALCM-B but to the B-1 and the ACM.

Senator Goldwater. The first models had some trouble with terrain-following. Has that been eliminated?

General **Gorton**. Yes, sir, it has. We are very confident in its capability today. There were in the initial tests, if you go back to both the SLCM and GLCM, the Tomahawk derivatives--they are all Tomahawk derivatives—there were in the initial tests some difficulties.

As far as the ALCM, we have had 15 test flights on the ALCM since becoming operational. One failure was associated with the B-52 software and two minor failures within the ALCM itself which were random and have been corrected. One began to wander off course and was destroyed. But we are in good shape as far as tests go.

General **Russ**. Sir, one of the things that you recall we had difficulty with initially on the engine was the amount of thrust that we were getting out of the engine, and on a very hot day at high terrain altitudes it was difficult for the cruise missile to climb. Therefore, you ended up programming in a little higher altitude than you would like when you went over rough terrain.

Part of the correction to that is to increase somewhat the thrust of the engine and that is what that extra money in the budget is for, and in fact Congress put some in last year for use to continue that task. It would be just a swap-out. It is a small change to the engine. It is the same engine. We just upgrade the thrust a little bit to allow it to climb and descend easier in the terrain-following mode.

Senator **Goldwater**. What thrust are we talking about now?

General **Gorton**. It is an increase of approximately 22 percent of the thrust, and I think the thrust on the engine is about—I want to say about 600 pounds.

Senator **Goldwater**. How much?

General **Gorton**. I want to say about 600 but I will have to check that. We have that with us.

[The information follows:]

ALCM-B ENGINE THRUST

ALCM engine thrust is [deleted] pounds, static, sea level, standard day conditions at maximum continuous power.

Senator **Goldwater**. That will get you a Mach 1 cruise, will it not?

Dr. **Cooper**. About 550 miles per hour, Senator.

General **Gorton**. At the present time, the engine we have in the system—as you know, we have three squadrons on alert with ALCM's today on our G model B-52's. We will be bringing on a fourth this month and a fifth squadron later on in the year.

At the present time, as far as the engine goes it is perfectly suitable for operations. The upgraded engine will give us a lot more flexibility in our target base because of the increased performance that will allow us to maneuver a little bit better in certain other areas that we are now just working around.

Senator **Warner**. Where are you in the test program? Obviously, you are way past research.

General **Russ**. We have completed 15 of the operational tests—15, sir. We did a lot of development tests and this is operational tests the Strategic Air Command is doing and I think what General

Gorton said was 12 of them have been entirely successful; 3 of them have been partially successful.

There were some minor things that were wrong with them. We flew the first test flight in Canada. I think it was Tuesday, if I'm not mistaken. It was a captive-carry test where we flew—went up to the northern part of Canada and flew the route that the actual missile would fly. This was the first test run—dry run, if you will—with the missile and that was very successful. We plan on conducting further free flight tests in Canada in the next fiscal year.

Senator **Warner**. What ranges do you try to achieve with that test?

General **Russ**. I think the total range we flew on that was something like 1,400 miles. It flew the route.

Senator **Warner**. 1,500 is your max, isn't it?

General **Russ**. Yes sir, nominal operational range. Well, I think the actual range is classified.

Senator **Warner**. And you did 1,400?

General **Russ**. We flew about 1,400, wasn't it, John?

General **Shaud**. Sir, we took off out of Grand Forks at our most recently operationally ready ALCM wing. We flew up into the northern reaches of Canada and came to the target complex at Cold Lake and graded our ALCM.

And thus far it looks like a very successful test, taking it near the nominal 1,500 nautical miles.

Senator **Warner**. In other words you went up into Canada and then fired it.

General **Russ**. We did not actually fire this one. What we did was we made the ALCM believe it was fired. We had another airplane that flew along. So we just carried it along on the airplane to go through the full route to make sure all of the systems worked and the inertial navigation system in it worked and that is the way we tracked it. The next one will be a free flight.

Senator **Warner**. Have you done a free flight yet?

General **Russ**. Oh, yes we have done lots of them.

Senator **Warner**. In the operational?

General **Russ**. Yes, we have done a lot. We have not done any in Canada.

Senator **Warner**. Where is the range that is used frequently?

General **Russ**. We generally use them in the Hill, Wendover area in Utah and Dougway, out in the Nevada-Utah complex.

Senator **Warner**. What kind of ranges can you achieve with that?

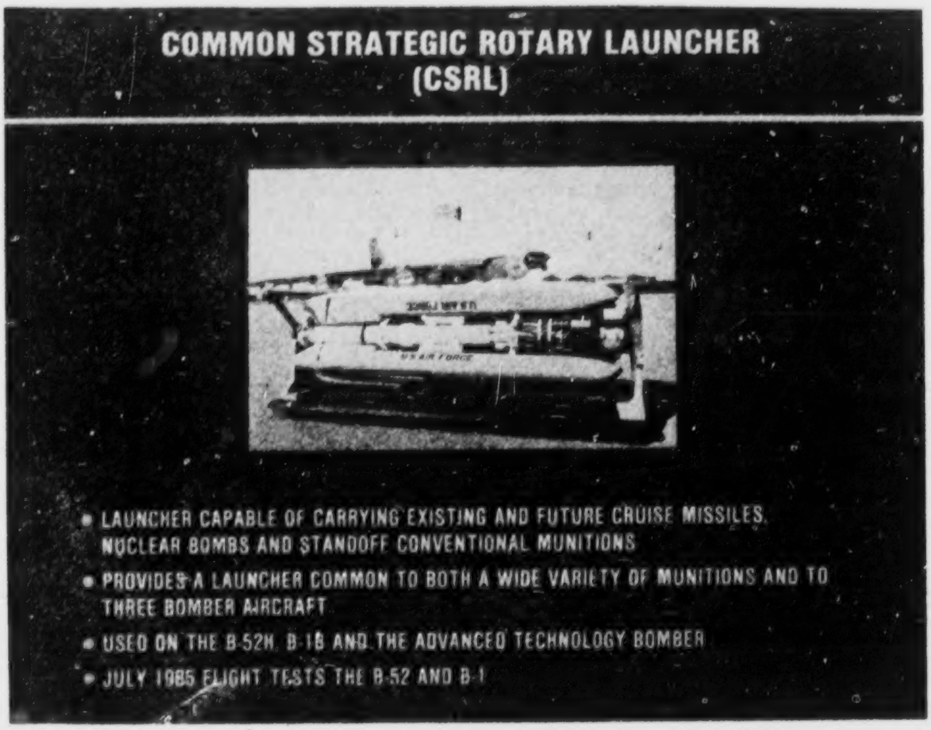
General **Russ**. Well, we launch them sometimes from out over the water and they will come in north of Point Mugu in southern California, come across the Edwards complex and then they would go up range. They actually do kind of some squares and go around so that they get extended range, but we have simulated the range that the missile will fly.

Senator **Warner**. Thank you.

Dr. **Cooper**. Senator, just one point. We completed development testing a long time ago with development missiles. I think it is important to note for the record that the missile we are testing now are off the production line. So we are in that phase of the test program—follow-on test and evaluation.

General Russ. And it is the training that the air crews are getting to acutally launch the missile. So these will continue to go on throughout the life of the program.

General Gorton. The next subject, Mr. Chairman, will be the common strategic rotary launcher a picture of a mock up which is shown here.

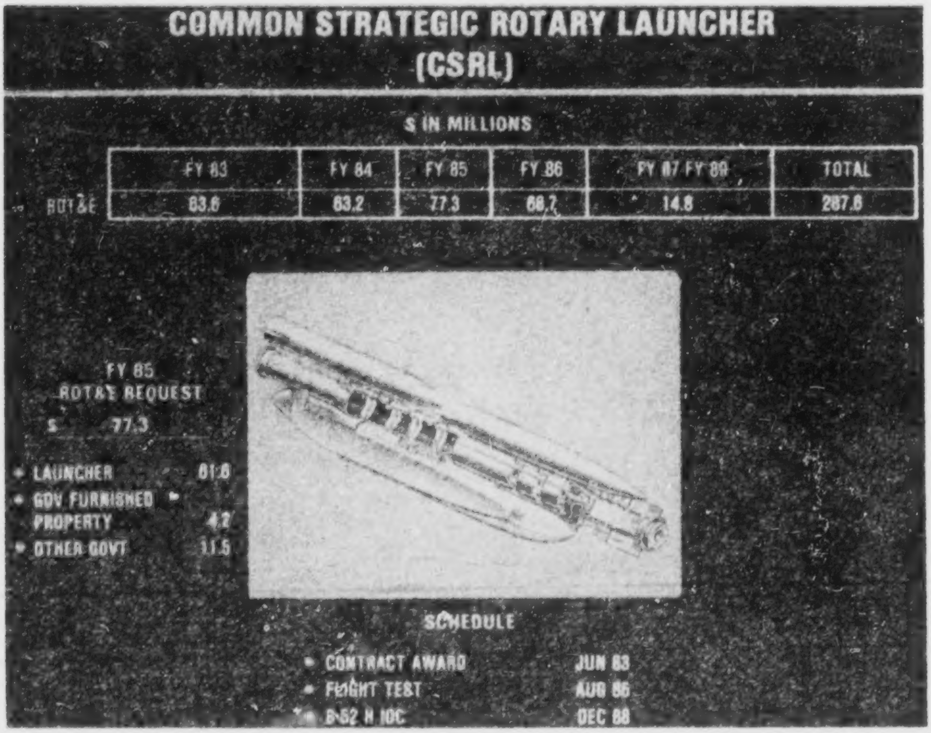


COMMON STRATEGIC ROTARY LAUNCHER (CSRL)

- LAUNCHER CAPABLE OF CARRYING EXISTING AND FUTURE CRUISE MISSILES, NUCLEAR BOMBS AND STANDOFF CONVENTIONAL MUNITIONS
- PROVIDES A LAUNCHER COMMON TO BOTH A WIDE VARIETY OF MUNITIONS AND TO THREE BOMBER AIRCRAFT
- USED ON THE B-52H, B-1B AND THE ADVANCED TECHNOLOGY BOMBER
- JULY 1985 FLIGHT TESTS THE B-52 AND B-1

This launcher is designed to eliminate the potential that existed for development of five unique launchers to carry strategic, weapons, principally, ALCM's. The launcher program has been restructured since last year in line with—we begin to restructure the program awaiting a source selection decision on the ACM to assure that this launcher would be compatable with the ACM.

So the program has been slipped and restructured with an additional cost of about $13 million in RDT&E and a total cost throughout the whole program of an increase of about $71 million.



COMMON STRATEGIC ROTARY LAUNCHER (CSRL)

$ IN MILLIONS

	FY 83	FY 84	FY 85	FY 86	FY 87-FY 89	TOTAL
RDT&E	63.6	63.2	77.3	68.7	14.8	287.6

FY 85 RDT&E REQUEST

$	77.3
• LAUNCHER	61.6
• GOV FURNISHED PROPERTY	4.2
• OTHER GOVT	11.5

SCHEDULE

• CONTRACT AWARD	JUN 83
• FLIGHT TEST	AUG 86
• B-52 H IOC	DEC 88

However, that was necessary to harmonize it to make sure that we had a launcher that would be compatible with both ALCM's advanced cruise missile and our normal gravity weapons and SRAM's. The ALCM development is shown here. The ALCM procurement as we discussed earlier is in the B-52 modification line. The basic efforts on development at this stage would be associated with integration and test work on the ALCM—on the CSRL.

Senator GOLDWATER. You are going to put this launcher on the A-10. Did I hear that?

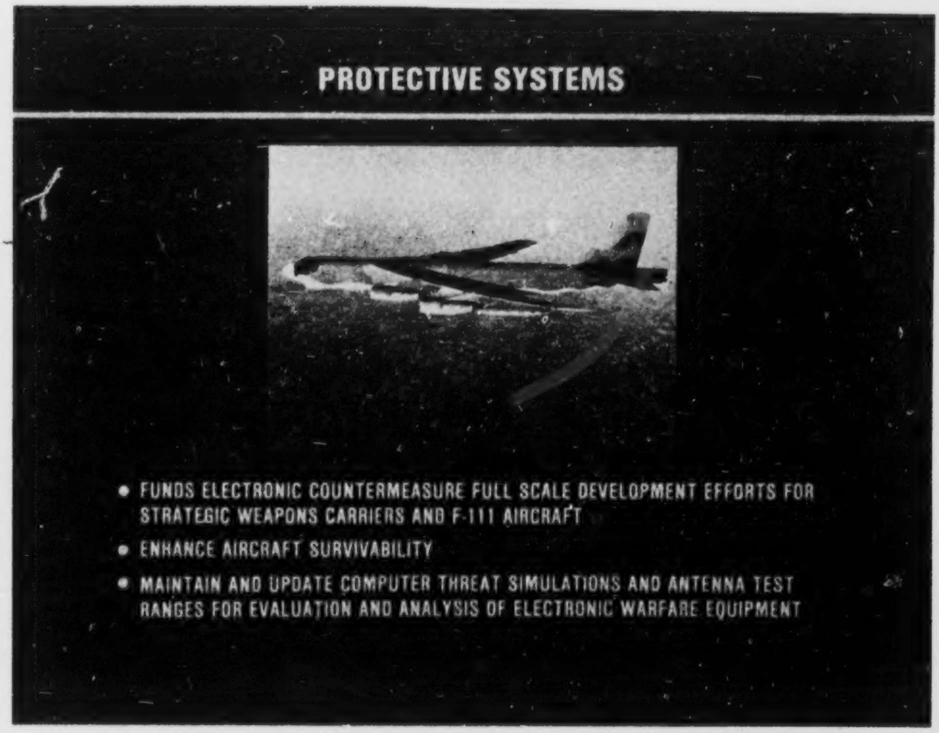
General GORTON. No, sir. [Laughter.]

Senator GOLDWATER. That was not the agreement?

Dr. COOPER. It is almost as big as the A-10, Senator.

General GORTON. This program will save the Congress and the taxpayer, it could be as much as about $260 million over what we would have had to do in order to assure our capability by buying five separate launchers.

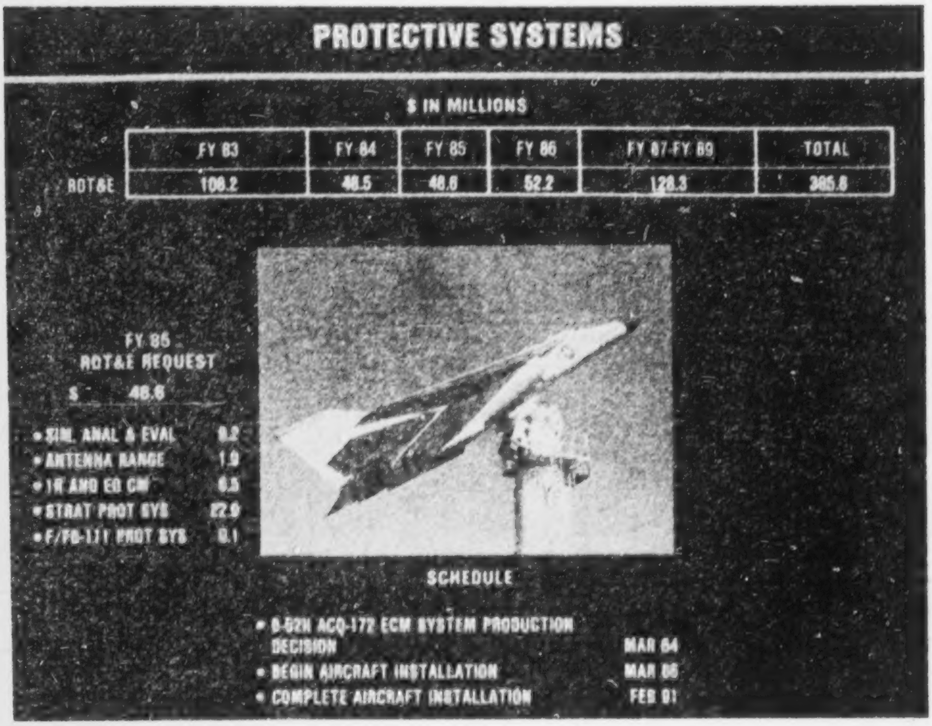
This next program is associated with self-protection or protection of the B-52. This is an actual B-52 on one of our ECM ranges or test stands.



PROTECTIVE SYSTEMS

- FUNDS ELECTRONIC COUNTERMEASURE FULL SCALE DEVELOPMENT EFFORTS FOR STRATEGIC WEAPONS CARRIERS AND F-111 AIRCRAFT
- ENHANCE AIRCRAFT SURVIVABILITY
- MAINTAIN AND UPDATE COMPUTER THREAT SIMULATIONS AND ANTENNA TEST RANGES FOR EVALUATION AND ANALYSIS OF ELECTRONIC WARFARE EQUIPMENT

These protective systems we discussed in the procurement accounts. Basically they are for B-52's, F-111's and are centered around basically the ALQ-117 and 172 procurements in RDT&E.



PROTECTIVE SYSTEMS

$ IN MILLIONS

	FY 83	FY 84	FY 85	FY 86	FY 87-FY 89	TOTAL
RDT&E	108.2	48.5	48.6	52.2	128.3	385.8

FY 85
RDT&E REQUEST
$ 48.6

• SIM, ANAL & EVAL	9.2
• ANTENNA RANGE	1.9
• IR AND EO CM	6.5
• STRAT PROT SYS	22.9
• F/FB-111 PROT SYS	8.1

SCHEDULE

• B-52H ALQ-172 ECM SYSTEM PRODUCTION DECISION	MAR 84
• BEGIN AIRCRAFT INSTALLATION	MAR 86
• COMPLETE AIRCRAFT INSTALLATION	FEB 91

Senator GOLDWATER. You know we are putting up the B-52 at the Air Force Academy. It looks very good.

Senator WARNER. Senator Goldwater, could you amplify that? It is going to be in an operational status?

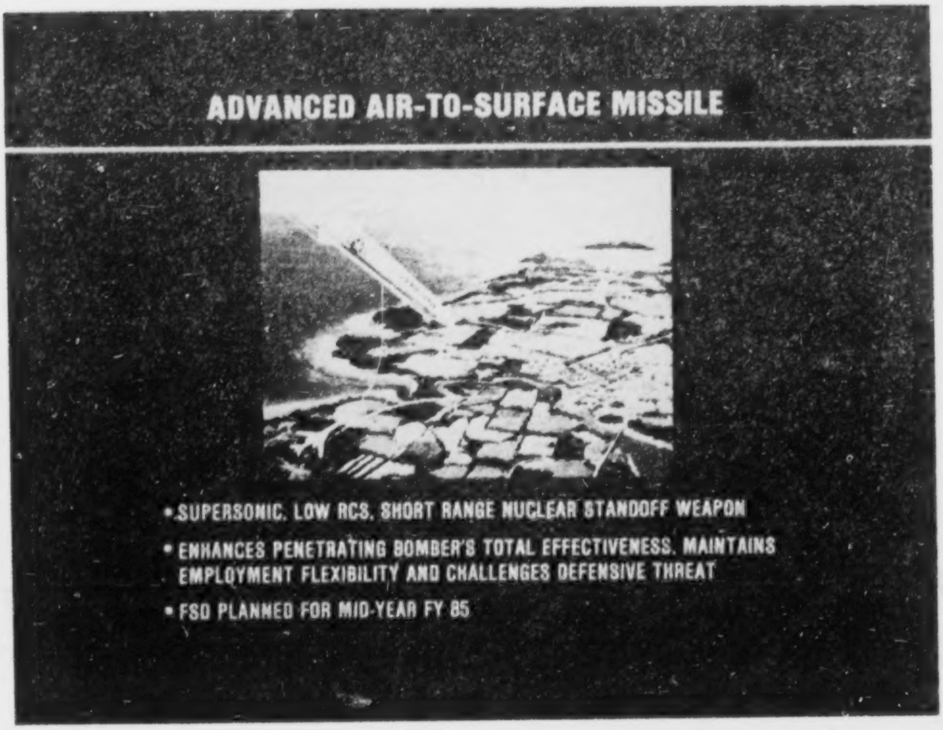
Senator GOLDWATER. It is put up there for the cadets to move into the cathedral some night. [Laughter.]

Senator WARNER. You walk through the B-52 to get into church, is that it?

Senator GOLDWATER. You are already in church when you are in a B-52. [Laughter.]

General GORTON. The next is the integration of the ALQ-172's on B-52's and we would hope to complete installation by February of 1991 on this system.

The next program is a new start. It is called the advanced SRAM.

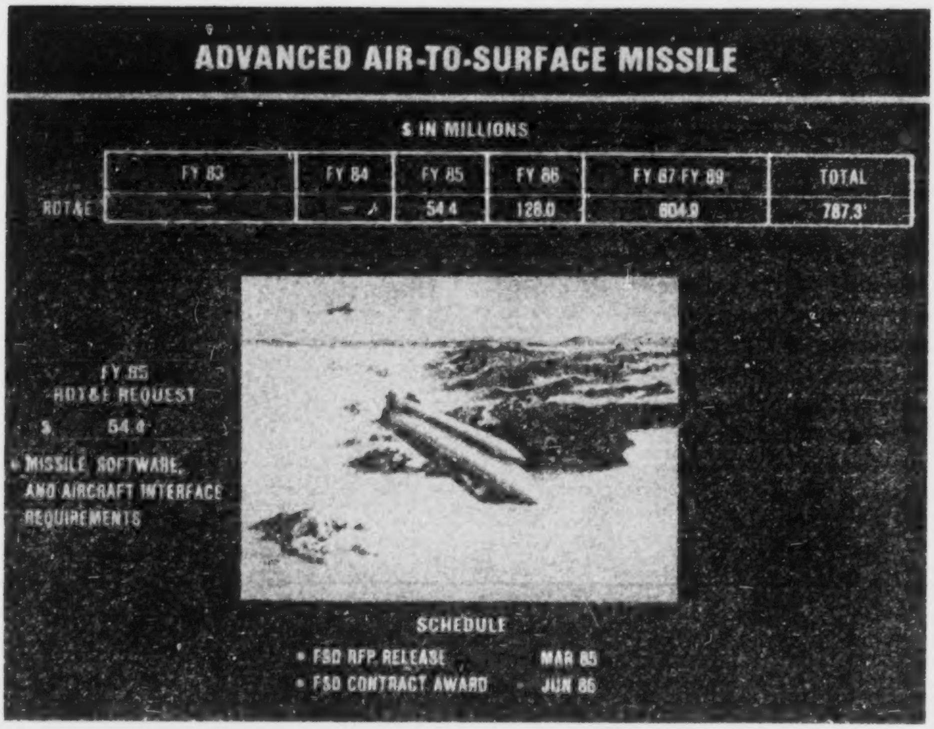


ADVANCED AIR-TO-SURFACE MISSILE

- SUPERSONIC, LOW RCS, SHORT RANGE NUCLEAR STANDOFF WEAPON
- ENHANCES PENETRATING BOMBER'S TOTAL EFFECTIVENESS, MAINTAINS EMPLOYMENT FLEXIBILITY AND CHALLENGES DEFENSIVE THREAT
- FSD PLANNED FOR MID-YEAR FY 85

Basically, our current family of SRAM's, as you are aware, were purchased some time ago. They basically had a 5-year systems life on the rocket motor. We have depleted those SRAM down to a relatively low level and are continuing to deplete them in terms of other requirements such as OT&E testing, plus regular training, plus the ASAT requirement for those motors.

The motors are old. We have had problems with them. We cannot really predict how much longer they will last, and plus the target set and the environment with which we are confronted environmentally has changed, which leads us to the request for a new start for an advanced air-to-surface missile.



ADVANCED AIR-TO-SURFACE MISSILE

$ IN MILLIONS

	FY 83	FY 84	FY 85	FY 86	FY 87-FY 89	TOTAL
RDT&E	—	—	54.4	128.0	604.9	787.3

FY 85
RDT&E REQUEST
$ 54.4

- MISSILE, SOFTWARE, AND AIRCRAFT INTERFACE REQUIREMENTS

SCHEDULE

- FSD RFP RELEASE MAR 85
- FSD CONTRACT AWARD JUN 86

We would be requesting in 1985 $54.4 million to get an RFP on the street. This year we are doing some study of concept definition with regard to an advanced SRAM. Basically, this $54.4 million would be for some interface work and further delineation of getting contractors for competition.

Dr. COOPER. General Gorton, you just might want to clarify while indeed it is a cruise missile of sorts we really are not casting it as an advanced cruise missile. It is a supersonic missile.

General GORTON. If I did it was a mistake. It is a replacement for the SRAM—supersonic, very low RCS, relatively short range and it will provide us an increased capability on the changing targets that we see particularly against hardened target—not a very hard target, but allow us to take on with more effect the hardening of some of the targets we see.

Senator WARNER. To the extent in open session you can describe it, what is the tactic of the aircraft? How is it launched?

General GORTON. The aircraft—I will let General Shaud discuss this in detail with you, but the aircraft is remaining low. The missile is launched off, and there are a number of type of profiles that could be flown but it generally goes up and takes on ballistic type of profile so the penetrating aircraft does not have to manuever except to be in the general area for the launch and, John, if you would——

Senator WARNER. This will be a mixed weaponry on the B–1B?

General GORTON. The B–1B could carry this weapon, yes, sir.

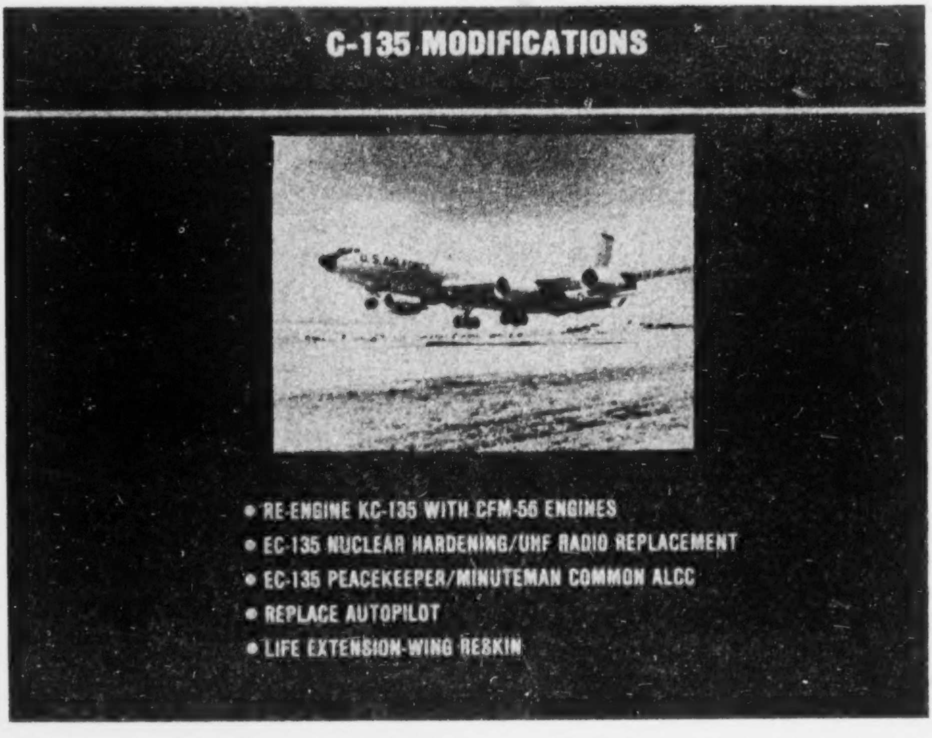
General SHAUD. Sir, as you go through a weapons scenario, the first set of weapons, of course, released by the air crew would be the ALCM. It basically would take targets on adjacent to the route of the bomber.

Your shorter-range weapons, as General Gorton pointed out, are a replacement for the SRAM. It is still in the short-range category, but it gives us almost three times as much range as the SRAM and also cuts the circular error about in half.

It gives us increasingly hardened target capability and where these weapons help you is as you are progressing toward your target it enables you to fight your way in, and we would use it against hardened targets and, to a certain extent, as a defense suppression to enable the penetration of the bomber.

That is basically the tactics sir, and it would be used predominantly at low level, as Senator Goldwater pointed out earlier with our EVS system, and I think we have our modification pretty well complete on that. We can stay in that closed curtain environment looking out with a low light level TV presentation as well as the IR presentation and then use that as we would drop our gravity weapons. So that is the array of weaponry and tactics.

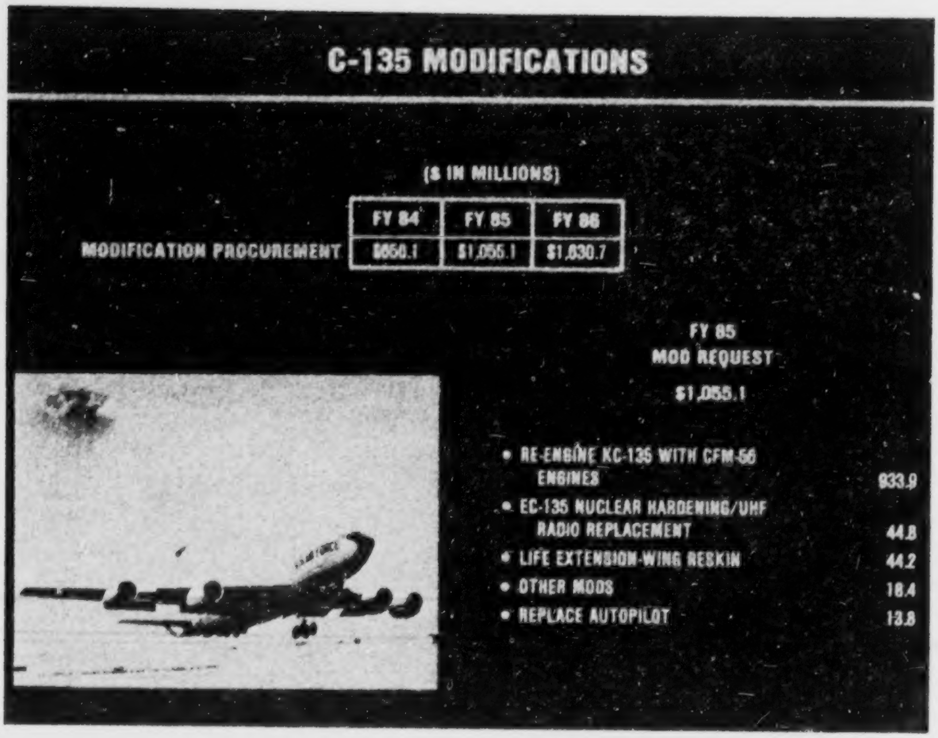
The next program, sir, is the C-135 modification program.



C-135 MODIFICATIONS

- RE-ENGINE KC-135 WITH CFM-56 ENGINES
- EC-135 NUCLEAR HARDENING/UHF RADIO REPLACEMENT
- EC-135 PEACEKEEPER/MINUTEMAN COMMON ALCC
- REPLACE AUTOPILOT
- LIFE EXTENSION-WING RESKIN

The major activity in the C-135 modification program is the modification of our KC-135-A models with CFM-56 engines. There are a number of other efforts going on throughout the whole KC-135 fleet in the airborne command and control aircraft and a number of others.



C-135 MODIFICATIONS

($ IN MILLIONS)

	FY 84	FY 85	FY 86
MODIFICATION PROCUREMENT	$650.1	$1,055.1	$1,630.7

FY 85
MOD REQUEST
$1,055.1

• RE-ENGINE KC-135 WITH CFM-56 ENGINES	933.9
• EC-135 NUCLEAR HARDENING/UHF RADIO REPLACEMENT	44.8
• LIFE EXTENSION-WING RESKIN	44.2
• OTHER MODS	18.4
• REPLACE AUTOPILOT	13.8

The modification account reflects $1.055 billion this year with the major factor being in the modification of our KC-135 fleet with CFM-56s.

Senator GOLDWATER. How many do you have left for the National Guard?

General GORTON. The National Guard, there are eight aircraft that have not been modified with JT-3D's, Senator Goldwater. There are no Guard aircraft at this time modified with CFM-56 engines. There are eight remaining Guard aircraft at Fairchild which are non-modified. They have the standard J-57 engine in them.

Senator GOLDWATER. Are they not all in the Washington wing?

General GORTON. They are in the Washington wing, that is correct sir.

Senator GOLDWATER. I asked that because my old outfit comes under that and they have been completely re-engined and we are getting quite a bit of pressure from Washington wanting to get theirs completed.

General GORTON. I understand, Senator Goldwater. Basically, we are proposing in this procurement account to modify the wing at Fairchild—the active duty wing at Fairchild—with CFM-56 engines. We would also modify at that time for homogenous maintenance posture at Fairchild—modify those additional eight Guard aircraft.

As you are well aware, the JT-3D is an improved engine over the J-57 and provides about a 1.2 ratio to 1 of a KC-135A. The CMF-56 is about a 1.5. That is to say, I get about a half another KC-135A for every CFM-56 modification. It is much more than just an engine modification to the aircraft. There is also a significant upgrading of the aircraft itself to provide what we believe is the next generation of tankers that will be useful through the turn of the century.

So it is truly a bargain and in fact we have just finished negotiations with SNECMA, and their representative in this country, and we have got a return on the contract and reduction in the cost.

Senator GOLDWATER. One of the best programs you have ever done.

General GORTON. We have had an extremely successful test program on this. It has worked out very well and will be entering into the force. The first one I believe is this year, as I recall.

Senator GOLDWATER. We were never able to take off with a full load because of the heat in Arizona, and now we take off with a full load even on the hottest days when the runway temperature will get to 130 and it still takes off.

General SHAUD. Is that Sky Harbor, sir, with the JT-3D?

Senator GOLDWATER. Yes.

Dr. COOPER. This is not the new one, Senator Warner.

Senator Goldwater, could I just make a response to your question? I visited a number of Guard units myself and the ones that had the JT-3D are absolutely delighted with it. It is a very significant improvement over the older engine. This engine in fact gives us even more capability, as you well know. We have not requested funds for the JT-3D and quite frankly it is a simple matter of budget priorities. But I think the record should clearly reflect that our Guard units are very pleased with the JT-3D.

General GORTON. We are asking for 53 kits for modification in this procurement account this year.

General SHAUD. One of the priorities, sir, as you know, at Phoenix is with the heat, pressure, and altitude, also the environmental concerns, in JT-3D is a tremendous improvement over the J-57's.

Senator GOLDWATER. Well, that old rascal, you could see it from Tuscon taking off.

General SHAUD. Yes, sir. [Laughter.]

General GORTON. That completes a very brief overview of those elements within the strategic air-breathing program. We are prepared to take questions.

Dr. COOPER. General Russ has a movie, Senator. I think it would be a nice way to round this presentation off.

Senator WARNER. It is always nice to have a movie. Just do not tell us what it cost to make the movie.

Dr. COOPER. I think what he wants to do is brag a litte bit about being able to fly the B-1 bomber.

Senator WARNER. If I recollect there were four at one time and then we dropped——

General GORTON. We built four B-1A models. We are flying today B-1A, No. 2 in the test program. We will bring B-1A, No. 4 back into the test program this year, so we will be using basically two of the original B-1A's in the test program.

Senator WARNER. My recollection is 2 or 3 years ago we fought hard and got some money for hardening of one of the B-1A's to run it through some EMP testing.

General **Shaud**. The ECM testing, sir, was with model 4, if that is what you mean.

Senator **Warner**. So is that one going to be operational?

General **Gorton**. That is correct, sir. In fact, it is the one that is coming back in July, and it will be the electronic test aircraft. That will be its principal role in the test program.

Senator **Warner**. So there is no intention to bring the other two back?

General **Gorton**. No, there is not, sir.

Senator **Warner**. Where are they at this point?

Dr. **Cooper**. One of them is still at Edwards. In fact, they may all still be at Edwards. One of them was the structural aircraft that was used for shake, rattle, and roll tests.

Senator, I am not sure we answered your question on hardening. I am not quite sure we have got an answer for you. You are talking about hardened against electromagnetic pulse and what General Shaud responded to was ECM. Of course, the B-1 is hardened against electromagnetic pulse. I am not sure specifically what you are referring to.

Senator **Warner**. I just recall 3 or 4 years ago I personally got involved to keep one airplane left.

Dr. **Cooper**. To test on the trestle?

General **Shaud**. Sir, I think the only thing we have had on the trestle, if I remember right, is the B-52G, but the funding discussion that I recall I think had to do with the ECM testing that we wanted to do with Model 4 to keep abreast of the technology.

Senator **Warner**. That is correct. Did that take place?

General **Shaud**. Yes, sir, it did.

General **Russ**. As you know, Senator, the airplane is designed from the ground-up to counter EMP. So the way it is done, the way it is shielded, it is already protected.

On this movie, I flew the B-1 a while back and I was very impressed with it. As Senator Goldwater knows, I have been flying fighters all my life, so it was something different for me to go out and fly a bomber. But I will tell you that I was very, very impressed with the airplane.

I have never been so impressed with an airplane like this in my life. It was easy to fly. It did everything it was supposed to do, and I would like to narrate a portion of this film and show you some things and I think you will get the impression by looking at the film.

[A film was shown.]

General **Russ**. This is at Edwards, early morning. The test community likes to get up in the dark and take off in the early morning.

Senator **Warner**. How many crew members can that carry? Is it just configured with a standard crew? Is there extra space?

General **Russ**. It has a crew of four, sir.

Here you see the airplane taking off, the four afterburners going, the four General Electric engines, 30,000 pounds of thrust each.

Senator **Warner**. Is this the same ship that went to Farnborough?

General **Russ**. Yes, sir, it is. You can see the shot here. The wings are fully extended to about 15 degrees sweep, which is what they have when they take off.

Underneath the airplane, this is the general area where they would hang cruise missiles.

It has extremely good visibility sitting in the front. We went up and hit the tanker and it was extremely stable on a tanker. The receptacle is right out in front of you, so you just drive right in and refuel. You can take some 6,000 pounds a minute. You can see that it is about the same size as a KC-135 platform when you look at it from the top.

After we got off the tanker, we went down to do some low-altitude work. We were going to run against some various threats. You can see the wings sweeping here. It sweeps back to about 67 degrees. That allows you, of course, much better aerodynamics for high speed flight.

This is a low-level shot. You can see with the wings swept. This is about 500 feet at this point. I will show you some shots where I got down to 200 and a little lower than I probably should have.

Now this is a shot. There is the shadow. You cannot see the airplane in that shot. You will see it in a minute. But that is the shadow on the ground. You can see how well the camouflage blends in. You will see the airplane in a minute. There it is.

Senator GOLDWATER. Is your autopilot on this one equivalent to terrain-following?

General RUSS. Yes, sir. This will give you a feeling of the speed and the altitude—a little lower there when you cross your shadow, but you get a feel for the flight.

This is some of the flight through some of the mountainous terrain. It has an automatic feature that will allow you to fly at 200 feet, at 0.85 mach or 550 miles an hour, or knots per hour. We use terrain-masking so you can fly right alongside of mountains.

You can see here where I fly and went down behind a hill. But this is automatic terrain-following. You will see it. This is a shot—actually it is a belly camera—but is it pretty much what you see from the cockpit. It is kind of the same idea, and it will show you how the system works going over a mountain.

You can see it moving up and down a little bit as it is terrain-following.

Senator WARNER. What speed are you at now?

General RUSS. 550 knots, sir. This is a little slower film. You see how it comes over when it goes over a hill and then it comes back up again and automatically picks up the dips. It is kind of like in an elevator sometimes when you stomach goes down.

When it points down at 550 to 600 knots like that and you are only a couple hundred feet off the deck, it makes you hope that it all works—and it does. [Laughter.]

Senator WARNER. Just a little microchip in there somewhere?

General RUSS. Well, it has redundant systems, so if one fails, they have another. It is a fail safe system.

Again, you get a feel for the way it operates at that low altitude over the mountains. Again, you can see how smooth it flies over the mountains.

This airplane has two little small king-of-life wings up here in the front that give it a very stable ride, and it is just so stable it is unbelieveable. Anybody that has flown over the desert at low altitude during summer will tell you that it is really tough to do. You have flown in a lot of airplanes, I am sure, sir, and I know you understand how it can get, but this airplane is stable as a rock at high speed, at low altitude.

Coming back to land we sweep the wing back out to give it the ability to land at much slower speed. It also gives the ability to land on a lot of different runways and take off on runways. You do not have to have big, long runways that we have in the Strategic Air Command for the B-52.

When you come down final, normal final approach speed is about 140 knots. Coming in to land here—this is in the belly camera.

Senator WARNER. What length strip do you need?

General RUSS. Oh, you could land on a 7,000-foot airstrip. Most of the Strategic Air Command strips are 12,000-13,000 feet.

Senator WARNER. Well, I was thinking if we went into a dispersement pattern, I do not know the mission profile.

General RUSS. Standard NATO runways are 8,000 feet, and there are a multitude of runways at 7,000 feet around the country, so you could get in and out of those.

You can see the visibility you have. You mentioned the people. There are two people in the front, and then there are two people right behind that. An offensive and a defensive operator are right behind the pilots. You can actually get up and walk between the two. There is more room in the front cockpit of that than there is in the B-52.

Senator WARNER. Now are you pressurized in your cabin or in your suit?

General RUSS. In the cabin, sir, it is shirtsleeve atmosphere. You recall when they first built the B-1 we had a capsule and the whole capsule would be ejected. That was costly and it was heavy and we decided not to do that. So we have gone back to what we did before and this airplane will have ejection seats—a normal ejection seat like you have in our standard fighters.

So you wear the same sort of gear. You wear a normal flight suit and just a harness, a normal harness. You get in and strap yourself into the seat.

I might say that the thing that I enjoyed so much was that when I got into the airplane, I felt at home, because it had a stick like a fighter does, and had throttles like the fighter does. The throttles are on the left and all four throttles, each throttle is no wider than about the width of your thumb.

So, when I put my hand on the throttle it was like flying a single-engine jet, only with four 30,000-pound thrust engines. So, when we run that thing up, I tell you, it just took off and went away.

Senator WARNER. Dual control for right and left seat?

General RUSS. Side-by-side and either pilot can fly the airplane. Both pilots have a set, have a stick and throttle, so either one can do it.

I thought this film would be useful to see.

PROFILE OF FOUR CREW MEMBERS

Senator WARNER. What is the profile of the four crew members?

General **Russ**. You have a pilot. You have a copilot. You have an offensive system operator who gets you to the target and drops the bombs, and you have the defensive systems operator who hopefully defends, runs the ECM and prevents tracking various radars and jams missiles and so forth.

Senator **Warner**. And the training syllabus is, of course, clear for the pilots—standard pilot training, and on into phase into B-1. What is the training profile for the other two crew members?

General **Russ**. They go initially to a navigator training school and then after that they go to electronic warfare officer school, which is similar to a graduate navigation school, and then they go into combat crew training with pilots, and I am not sure how long that is. John, do you know?

General **Shaud**. Sir, let me just add that it is very similar, if you will, to the training profile for a B-52 crew. The exception, the two people that are not there are the radar navigator, as we call it, in the B-52. He is a navigator. Now you have a single offensive systems operator, and the defensive system operator is the same as the electronic warfare officer on the B-52, only now you do not have a gunner.

So as far as the training syllabus, the time phasing is just about the same as we do with the B-52, and, of course, with the modernized equipment, but it is not a dramatic change. I guess that is the point I am trying to make.

Senator **Warner**. To what extent is there interchangeability in that cockpit? Say you got into a problem and one is injured or something happened.

General **Shaud**. Sir, the copilot, as General Russ pointed out, has full facility to fly the airplane. If I remember right, in the B-1B there will be an IP seat between the two pilots where he would be available on an instructional ride, for example, to fly the aircraft.

Downstairs with the offensive systems operator and defensive systems operator those are unique specialities. They are specifically trained for what they do, so there would not be a redundancy.

Senator **Warner**. I am less concerned about the redundancy but interchangeability in case you have a problem.

General **Russ**. You can get up and freely move from one position to the other.

Senator **Warner**. But the defensive and offensive systems operators downstairs could not come up and fly if necessary.

General **Shaud**. They are not trained to fly, sir. They probably think they could, though.

Senator **Warner**. And vice versa. The pilots could not go down and operate the equipment down there?

General **Shaud**. That is right, sir.

Senator **Goldwater**. I just want to agree with what the General said. It is about the easiest airplane to fly I have ever been in. When you feel like rolling any airplane on takeoff, that is a good airplane, and I actually had that feeling.

I will never forget landing. I said I am going to try my best and I was landing that plane and the IP said why don't you put your nose wheel down. I said I am not on the ground yet. He said you have been on the ground for 500 feet. It is a fantastic airplane.

I do not see any trouble at all in training crews. I think you can check a man out a lot faster in a B-1 than you ever could in the complicated B-52. It has remarkable speed, remarkable acceleration. As the General said, you can hook up with a tanker with no sweat.

The sooner we get these rascals, the better off we are going to be. I just do not want to see the Air Force ever agreeing to buy less than the 100.

Dr. **Cooper**. We are fully supportive of 100, Senator.

Senator Warner, I would like to just make one comment, if I could. General Russ gets to have all the fun. He goes out and flies the airplane. I was out about a month ago.

Senator **Goldwater**. I used to have a lot of fun when I had your seat. What is the trouble? Have things changed? [Laughter.]

Dr. **Cooper**. They let him fly it. I have to listen to the briefings. I went out and spent 2 days, though, for a very extensive program review.

I want to make a comment. As I travel around the Air Force—and Senator Goldwater and I chatted about this the other evening—I am just continually impressed with the quality of young people that we have in the Air Force today. I do not think the Members that are not able to get out and go around the bases fully appreciate that.

I do not think we could be more pleased with the progress of the B-1 than we are at this point, but I do not want to leave the committee with the impression that it is a piece of cake. Is is not. When you see these movies, it seems like you are just getting up and flying the aircraft.

We have got a challenge in front of us. We are going to meet the challenge. We are at the phase of the program where we are starting to integrate the offensive avionics with the defensive avionics. It always kind of tickles me when people talk about this aircraft as being obsolete, all you have to do is get inside of it. It is anything but obsolete.

It is a very sophisticated piece of machinery and the challenge that we face over the next year or so is integrating the avionics together to make sure that when we put it all together it plays together. We are going to do that and the first step will be to put the basic machine together, the basic avionics, and as time goes on that will grow.

But I do not want to leave the committee with the impression that this is an easy thing to do. There are an awful lot of people putting a lot of time in on this, and, like I say, we are very pleased right now, but we have still got our challenges ahead of us.

Senator **Warner**. For the record, you have justified flight pay.

QUALITY OF YOUNG PEOPLE

Senator **Goldwater**. I am glad to hear you say what you said about the quality of our young people. I am extremely impressed. I would agree that any pilot of World War II would have a difficult time understanding, not flying, but learning which to punch, what to turn.

You actually have to be more of an engineer today to fly than a pilot, and I am extremely impressed at the quality of cadets that we are turning out at the Academy. We have 14,000 that want to get in there this year, and we can take the cream of the crop, and that is what we are getting. The main reason I argue against this thesis that our forces are not as ready to fight today as they were in 1980, they are more ready. Even though we are a little short of equipment, we are long on real high-class quality personnel.

Dr. COOPER. I could not agree with you more, Senator.

Senator GOLDWATER. By the way, Mr. Chairman, I have a series of questions here I would like to just submit to have them answered. This all relates to this program and the ATB.

Senator WARNER. Without objection.

ATB

Senator GOLDWATER. I have just got to say one word about the ATB. I still have my doubts. I have been planning to go out to Edwards to take a look at what they have. Of course, I may be prejudiced because I talk to Kelly Johnson a lot. Kelly does not think the ATB will ever fly, so one of these days I am going to drop in. I will let you know when we want to go and take a look.

Dr. COOPER. We would very much like to do that. I think it is important that you do.

Senator GOLDWATER. We will do it within the next several months.

Dr. COOPER. Thank you.

Senator WARNER. Senator, I do not mean to rebut you, but I did go out and visit the program for the ATB, and while I do not profess any of the flying proficiencies that you have, I am heartened by what I saw.

Senator GOLDWATER. They have a lot of problems with it. We may wind up being able to do with the B-1 what we are trying to do with the ATB, and that would be a heck of a solution.

Senator WARNER. But I hope you would share with me the viewpoint that at this particular juncture in these two programs we should not try and make that decision here in 1985.

Senator GOLDWATER. No, no, no. I just have—I am getting older, and the older I get the more I have doubts, and the more I talk to a guy just as old as I am, the more doubts I get. [Laughter.]

But we will see.

Senator WARNER. Mr. Secretary, we have indeed been impressed by the presentation this morning. I think the Department of the Air Force merits a commendation for the manner in which it has operated the programs that we have covered this morning.

You no doubt, being a pragmatist, recognize that this program will be examined very carefully in the Congress in conjunction with those efforts that will take place to retrieve from the defense budget a certain number of dollars, presumably to be applied to the deficit situation.

Recognizing that that will take place, recognizing that presumably members of this committee—and, I wish to say, myself unequivocally—will be a strong supporter for the B-1 program——

Dr. COOPER. We appreciate that, too.

Senator **Warner**. And the ATB. And I do not think the cruise programs we need be concerned with that, nor the tanker. But you are now being asked to provide us with some profiles and I will discuss with you the profiles momentarily, but profiles which will enable myself and other members of this committee and, indeed, other Senators to properly debate this matter when it arises.

Now you have got 34 units in your production for the B-1B.

Senator **Goldwater**. I am going to have to leave. Thank you, gentlemen.

Dr. **Cooper**. Thank you, sir.

General **Russ**. Thank you, sir.

General **Gorton**. Thank you, sir.

General **Shaud**. Thank you, sir.

Senator **Warner**. With the 34 production units I think we should look at, say, a 50-percent cut—maybe a one-third cut. I have got to have——

Dr. **Cooper**. You want us to spread it for you and give you our range of reductions?

Senator **Warner**. What sort of options might come forward, and show the impact on the multiyear concept—just frankly spell out all the answers as best you can.

Dr. **Cooper**. I understand that. We will do that, Senator, and try to do that completely. I think again it is like the question you asked us on the MX. You are looking for alternatives, and we will do that very completely for you.

I would like to make one comment, though, and I know you have been among our stronger supporters. We are continually asked for priority lists from the Department, and of course we are not in a position to provide priority lists, and you are not asking for that. I just do want to make the one statement for the record.

B-1 BOMBER

While we do not supply priority lists, there is no program in the Department that enjoys a higher priority than the B-1 bomber program. With that statement, if you would allow me to take your question back and give you several different production profiles, as you have asked for, we will do that. So you will have it for the record.

[The information follows:]

The B-1B Production Units

The B-1B will reach the four aircraft per month production rate in late 1986. This production schedule has been determined to be the most efficient and cost effective profile which satisfies the deterrent needs of the country. We have developed other preliminary planning estimates in response to a series of congressional inquiries as to the total program costs associated with various production stretchout options. The following chart summarizes the procurement profile, delivery profile, and total program costs of these production schedules:

Fiscal year	4 per month		3 per month		2 per month	
	Buys	Deliv	Buys	Deliv	Buys	Deliv
1982	1		1		1	
1983	7		7		7	
1984	10		10		10	

Fiscal year	4 per month		3 per month		2 per month	
	Buys	Deliv	Buys	Deliv	Buys	Deliv
1985	34	2	34	2	24	2
1986	48	18	36	18	24	16
1987		46	12	35	24	24
1988		34		36	10	24
1989				9		24
1990						10

[In billions]

	TY	1981	TY	1981	TY	1981
Total cost	$28.3	$20.5	$32.2	$23.0	$34.9	$24.5
Increase	n/a	n/a	3.9	2.5	6.6	4.0

Senator Warner. This question is not asked in the context of priorities. Again, being pragmatic—and I do not mean to be disparaging of any of my colleagues in the Senate, but I am certain that there will be raised the issue of what possible amount of dollars can be extracted from this program and the impact.

You can discuss it with me informally as you are working this up—what these profiles might look like.

Dr. Cooper. What I might ask, Senator, is if we can work with Mr. Bott and let him give us a specific set of questions, we will respond to them completely.

General Russ. Mr. Chairman, as an overview, though, I think it useful to know that the B-1 program through 1984 is 50 percent funded, so while we have only authorized and appropriated 18 airplanes we have authorized and appropriated 50 percent of the total amount of money that is going to be expended.

The next 50 percent, of course, will go for the bulk of the airplanes. So it is kind of a balance there, to kind of tell you that we spend all that up-front money and now we are going to get the payoff in the next year or so.

Senator Warner. I do not question that at all, and I am not here to lecture you on knowledge that you already know, but this question of the deficit, unlike anything we have ever experienced in this Nation, is of the gravest concern.

Senator Goldwater, in chairing a hearing yesterday, made the statement that potential threats from this deficit equate to any we might have from any enemy in terms of our military threat. I concur in that observation. I have said it before—that this deficit has a threat potential in terms of inflation and interest rates that can be just as destructive as certain military threats in the coming 18 to 24 months.

We have just got to deal with it. That is our job.

Dr. Cooper. I understand, Senator. I would like to make a comment, not to take away from that, because I know the situation that you face. As a resource manager in the Department, though, I would like to make the comment that having the $20.5 billion cap on this program has done more for us in terms of managing that program and keeping some of what would be, I am sure from the military point of view, a very useful capability.

So it has been a very, very useful management tool, and that agreement that was arrived at between the Congress and the President I think has done an awful lot to stabilize this program.

GUARANTEED WARRANTY

Senator **Warner**. By the way, what has been the impact of the controversial guaranteed warranty situation on this program?

Dr. **Cooper**. Well, of course, Senator, this is our fourth year of production and I do not know specifically what parts are warrantied, but the issues of warranties have come up since we actually put this into production, so it has not had a serious impact on it.

I am not aware what the warranty situation is.

General **Russ**. Senator, we have asked the Systems Command to come in and tell us what impact this is going to have on them. As you know, the warranty provision supposedly affects all programs, whether they are a new program or an old program, and any new contracts that we sign we are signing options on this program.

The initial review said that it could be significant, but we do not know for sure yet.

Senator **Warner**. So you might have to come in and ask relief from this cap because of that?

Dr. **Cooper**. It may be that we would come and ask relief from the warranty provision if it were going to have a very negative impact on the program, being as far down the line as we are, and the legislation does provide for that.

B-1B COST ESTIMATES

Senator **Warner**. What type of data form the basis for the recertification of B-1B cost estimates?

General **Gorton**. Senator, yes. As you well know, the Secretary of Defense sent that over to Congress in accordance with congressional requests at the end of last month. Basically there were three major efforts undertaken. The first effort was undertaken by the Program Office itself, in which the cost program was scrubbed entirely.

This was then looked at from a different perspective as to feasibility and reasonableness by the ASD, the Aeronautical Systems Division Comptroller. Subsequent to that the Systems Command Comptroller also did an independent cost review of the program and then finally the Air Staff and the OSD staff looked at the data and felt that it did meet the tests of reasonableness and was as far as we could go at the time and basically continued to substantiate our strong belief that $20.5 billion is feasible.

That is a very brief rundown on it.

Senator **Warner**. All right.

In your judgment, what are the principal areas of cost, schedule or technical risk attendant to the B-1B?

Dr. **Cooper**. Senator, as I have mentioned earlier and the reason I wanted to address that to the committee, I do not think the risks are high, but I do think we have challenges in the next phase of the program as far as integrating the offensive and defensive avionics.

Whenever you get into the software area these days, that always has the potential for problems. I would say that is an area that we have to keep our eye on very closely, but as far as we can see right now, where we are, we are pleased with the schedule and we are pleased with the costs, so I see no high risk areas that we care to put forward.

I might ask my companions here if they have any comments they want to make on that.

General **Russ**. I review the program every 2 weeks, Senator, and we also review it with the Secretary of Defense bimonthly, and the last review I had, which was, I think, 2 weeks ago, all the areas that we look at, the highest risk rating was low. It had no medium or high risk areas. That does not mean that something cannot occur and become a higher risk area, but right now all of the problems appear to be those normal sorts of things that you have during testing and production.

AIR-LAUNCHED CRUISE MISSILE

Senator **Warner**. Turning now to the cruise missile, what is your assessment of the need to improve the performance of the penetration capabilities of the existing air-launched cruise missiles, and is funding included in the fiscal year 1985 request for that purpose?

Dr. **Cooper**. Let me address that generally, and then I will let General Russ address the funding.

First of all, yes, we could improve the capability of the current generation air-launched cruise missile. Mr. Chairman, I think I had probably better stay away from the details of that, but I will make a statement that it could be improved.

However, as you are well aware, we are now in the process of bringing on the advance cruise missile, and our priority right now is to bring that on. We want to do that and we want to hold the option then of possibly in the future improving the current generation of cruise missiles.

Senator **Warner**. In short, you are not going to fund anything for that of significance?

Dr. **Cooper**. We have modest funding in the budget to keep that option available, but we have not made a decision to press on with it yet.

Senator **Warner**. We note there is no procurement of the ALCM-B requested this year. Does the availability of cruise missiles match the operational capability of the internal and external cruise missile launchers on the 52's?

General **Gorton**. Yes, sir, in fact, there are only 2 years—1988 and 1989—where we have in our program more hooks, if you will, pylons, than we do missiles. That amounts to 13 additional spaces for missiles not in possession, if you will, or we are short 23 in 1988 and only 13 in 1989. Those are very small numbers.

All other years, we have sufficient or better than sufficient missiles for the number of racks, pylons and so on.

Senator **Warner**. Mr. Levin, do you wish to ask some questions?

Senator **Levin**. Thank you, Mr. Chairman. Good morning.

Dr. COOPER. Good morning, Senator.

STEALTH BOMBER

Senator LEVIN. What is the IOC of the Stealth bomber?

Dr. COOPER. Senator, what we can say on the public record right now is early 1990's. We are right on the same schedule that we briefed to the committee last year, and we will have a separate session for that sometime in the not-too-distant future.

Senator LEVIN. But in any event it has not slipped any?

Dr. COOPER. It has not slipped.

Senator LEVIN. Once in a while we still read that the Stealth bomber is a paper bomber; is it?

Dr. COOPER. Let me assure you that it is not a paper bomber.

Senator LEVIN. Do we plan to buy more Stealth bombers than B-1 bombers?

Dr. COOPER. I cannot address that on the public record, Senator.

Senator LEVIN. Can you not address whether we plan on buying more Stealth than B-1 without telling us how many Stealth?

Dr. COOPER. I do not think I should, and we will have a compartmented session that will lay out in precise detail how many we plan to buy.

Senator LEVIN. OK. My understanding was that that fact is not classified, that the amount of bombers we are planning to buy is, but the fact of whether or not we are planning to buy more Stealth than B-1 is not a classified fact.

Dr. COOPER. I think at this point what I had better say is I had better treat it as classified and I will check that for you, but I believe it is classified.

Senator LEVIN. And then let us know if it is not what the answer is to the question.

[The information requested is classified and is retained in committee files.]

Dr. COOPER. We will do that.

Senator LEVIN. Is it fair to say we are planning on buying a significant number of Stealth bombers?

Dr. COOPER. I just better not comment, Mr. Chairman.

Senator LEVIN. I do not want him to say anything more than he feels comfortable saying.

Dr. COOPER. I just do not feel comfortable doing that.

REESTIMATION OF B-1B COSTS

Senator LEVIN. Fair enough. I would not want you to.

There has been a reestimation of the cost of the B-1B by the Air Force, as I understand it, which say that we are going to meet our $20.5 billion estimate.

Dr. COOPER. Yes, sir, that was the result of the Grassley amendment that was included in the legislation last year, and, General Gorton, do you want to run that down briefly again?

Senator LEVIN. That is just a preliminary question. There has been that reestimate?

Dr. COPPER. Yes, there has been, and the Congress has been notified of that.

Senator **Levin**. My question is this: As part of that reestimate have you validated the B-1B production costs by means of examining the monthly cost performance reports, the so-called CPR's of the contractors?

Dr. **Cooper**. I will let General Gorton respond to the details of that.

General **Gorton**. To the extent that we could on lot 1 and lot 2.

Senator **Levin**. Was there a significant degree to which you could not examine those CPR's?

General **Gorton**. Because of the early-on portion of the program, I will have to take that. I am not sure exactly your reference to "significant." The program cost data that we have today based on the program as currently structured, we examined every aspect of that cost, and we feel very comfortable—from three separate or actually four separate approaches, and all of them were with very minor variances, and all substantiated the $20.5 billion.

Senator **Levin**. Has the CAIG been able to validate whether the production costs of the B-1B, have they been able to validate those production costs, do you know?

General **Gorton**. That is correct, yes.

Senator **Levin**. They have?

General **Gorton**. To the extent that we have a production so far.

Senator **Levin**. My understanding is they have not been able to revalidate the $20.5 billion because they have not been able to examine all of those reports because they are not available, not because they are being kept away from anybody, but because they are not available.

General **Gorton**. They are not available, and that is the point. As we discussed earlier, we are now in the final negotiations with our first proposal from GE on multiyear contract, and so until that cost and the other associated contractor cost get nailed down in these negotiations, that cost just is not available at this time.

General **Russ**. Sir, let me say that there is no way to validate production costs until you do production. So what we validate is our best estimates of how we are going to do it. We look at all of the indicators. We look at the manufacturing process. We look at where subcontracts currently are. We look at a variety of different cost and schedule performances and we make our judgment on that, on production, and that is what we have done.

Senator **Levin**. But basically we have not had enough production experience yet to validate that part of the program?

General **Russ**. No. We have one airplane right now being put together. We have a lot of various parts, parts to the fifth, sixth, seventh, and eighth airplane, but we have not put those all together. But we do this for a living and make these forecasts on production and we have gone through all the normal processes that we do, and we see no indication that we are in any trouble at all on the way we are doing it.

Senator **Levin**. The specific question is that there are some limits to your reestimation, and one of them, as I undestand it, is that you have not been able because of the absence of production experience yet to validate the production costs.

General **Russ**. That is correct.

Senator **Levin**. That is all I am trying to establish.

Dr. **Cooper**. Senator, might I ask at this point, to go along with your discussion of this, that with the chairman's concurrence we submit for the record the letter that Mr. Weinberger sent to Mr. Bush, Vice President Bush, on this very issue?

It is pointed out very clearly in the letter that we were able to use CPR's to revalidate the development estimates since we are over 50 percent complete there, but it is made clear that we do not have complete data on the production program.

Senator **Levin**. I cannot speak for the chairman.

Dr. **Cooper**. Mr. Chairman?

Senator **Levin**. There is a request that we make certain information part of the record on the production costs that have been available to us as reported in a letter from Secretary Weinberger to Vice President Bush. The request is that that be made part of the record.

Senator **Warner**. I certainly join in that request, and also could you provide for the record the details of the B-1B cost recertification?

Dr. **Cooper**. Yes, we will, Senator.

[The information follows:]

B-1B Costs

The B-1B cost recertification effort is detailed below. It was accomplished in three parts as follows:

The B-1B program office performed an annual estimate of the B-1B program, tracking both program cost and content to the 1981 baseline. This analysis supported Air Force System Command's (AFSC) input to the FY 86 Program Objective Memorandum.

Senior Aeronautical Systems Division comptroller personnel conducted an Independent Sufficiency Review of the B-1B program office estimate. The estimate was reviewed for reasonableness (acceptable estimating methodology) consistency (cost compatible with scope of work) and completeness (all work as defined by the 1981 baseline cost estimate).

AFSC comptrollers led a detailed Cost Performance Report (CPR) analysis of the contractors' cost and schedule performance to date. Estimates to complete contracted effort, contract change analysis, application of management reserve, and manloading were studied and used to verify the B-1B program office estimate.

The results of these analyses were reviewed by the Air Staff and Office of Secretary of Defense Cost Analysis Improvement Group and confirmed the $20.5B (FY 81$) cost estimate in reasonable for accomplishing the baseline program.

Senator **Warner**. I thank the Senator and I ask forgiveness for not being responsive.

Senator **Levin**. That is OK. I just did not want to take over the role of the Chair.

Senator **Warner**. Senator, I would entrust that to you.

Senator **Levin**. I will take up that offer. In that case, it will be made part of the record. [Laughter.]

Talking about the B-1B for an additional moment, when will the first B-1B come off the line?

General **Gorton**. The first rolloff will be September of this year.

Senator **Levin**. And when will it be flown?

General **Gorton**. We anticipate flying it later on this year.

Senator **Levin**. This year?

General **Gorton**. Yes, sir.

Senator **Levin**. Will that be before or after the election?

General **Gorton**. I cannot comment on that. We will fly it when it is ready to fly.

Senator **WARNER**. That is a very pertinent question. It rolls out in September. If it was to fly before the end of the year, I think we could arrange it.

Senator **LEVIN**. Will you just make sure I am in it, if it is just before the election?

General **GORTON**. Guaranteed success. [Laughter.]

Senator **LEVIN**. Just kidding. I presume the election is not going to play any role as to when this thing flies.

General **GORTON**. No, sir.

Dr. **COOPER**. It will fly when it is ready to fly.

Senator **LEVIN**. It will be an issue in the election, obviously. One of the differences between the two leading Democratic candidates at the moment—things switch from week to week in our party—but one of the differences between those two candidates and the President is the B–1.

So just so long as there is no politics played on the issue of when it flies, I have enough confidence in you folks to believe that that is true, but it should obviously not play any role. Enough said on that.

WARRANTIES

Let me go back for a minute to the warranties issue, which our Chairman raised. There is a deadline, as I understand it, of March 14 for asking for waivers unless there is some extension of the present position of the DOD relative to the Andrews amendment.

Dr. **COOPER**. To implementing the Andrews amendment, yes, Senator.

Senator **LEVIN**. Do you know whether there is going to be an extension of that period for implementaion?

Dr. **COOPER**. No, I do not. I am not aware that we are going to ask for that, but I cannot say certainly that will not happen. I must tell you that we are still feeling our way with the Andrews amendment.

Senator **LEVIN**. Well, you have got about 5 more days, I guess, to file a waiver on it.

Dr. **COOPER**. Yes, sir, and that is resident in the office of the Secretary of Defense right now. It is not an Air Force issue directly.

Senator **LEVIN**. You mean the request for the waiver would come from the Secretary of Defense?

Dr. **COOPER**. Yes.

Senator **LEVIN**. And has the Air Force recommended to the Secretary that he request the waiver?

Dr. **COOPER**. Not to my knowledge.

Senator **LEVIN**. So that unless the Secretary asks for the waiver by the 14th or unless that period is extended there would then be no waiver and then the warranty provision would apply; is that your understanding?

Dr. **COOPER**. That is my understanding.

Senator **LEVIN**. And you are not recommending the waiver?

Dr. **COOPER**. We have not recommended a waiver. Of course, that is being worked in his office.

Senator **LEVIN**. Do you plan on asking?

Dr. **Cooper**. Senator, to my knowledge we are not recommending an extension of the waiver.

Senator **Levin**. Or that there be a waiver?

Dr. **Cooper**. Or that there be a waiver, but I am not confident to speak for Mr. Orr because I have not spoken to him, and he is the one who actually goes, as you well know, to the third floor and would do that.

Senator **Levin**. You might not know about it if he had done so?

Dr. **Cooper**. I might not, that is right. It has not come from my office, so it would be something that he would have done.

Senator **Levin**. Do any of our other witnesses know whether or not there is any intention?

General **Russ**. I do not know. I handle all of that in the Air Force, in the blue suit Air Force, and there is nothing in the blue suit Air Force that I know of.

Senator **Levin**. By the way, I am sympathetic to some of the problems with that amendment, so I am not just trying to simply say we ought not to seek some modifications of that amendment. I think that there should be some greater flexibility written into that amendment. I have spoken to Senator Andrews about it. He knows my feelings on it, and so I am not one to take the position that it should not be modified.

On the other hand, we have a law on the books and all of us believe the law should be obeyed.

Dr. **Cooper**. Senator Levin, General Russ and I just happened to have breakfast yesterday morning with Senator Andrews, and that was the topic of about an hour and a half's discussion. We are very supportive of warranties and, as you well know, in our engine competition that we just completed we think we have got an excellent warranty provision there.

Unfortunately, we think we are going to have some growing pains accommodating the Andrews amendment if it stays as it is on the books, but we are going to do our best.

Senator **Levin**. A couple years ago the Air Force testified that the Stealth program was not a high risk program. Is that still the Air Force's position—that it is not a high risk program?

General **Russ**. I would not like to—I do not consider it a high risk program. I think there are some high risk elements of any program, but if you put them all together I would not classify it as a high risk program.

Dr. **Cooper**. I think like any program, Senator, in the phase that it is in the primary risk right now is schedule and cost.

Senator **Levin**. Is there any higher risk to that program now than there was 2 years ago?

Dr. **Cooper**. Not to my knowledge, no, sir.

FUNDING FOR STEALTH

Senator **Levin**. And in terms of the funding of the Stealth program, without getting into the dollars—I know this is classified—are you asking for as many dollars, without saying how many, are you asking for as many dollars this year for Stealth as you said you would ask for Stealth last year for this year? That did not come out very clearly.

Dr. **Cooper**. I understand your question, though.

Senator **Levin**. I am not sure I understood it the way it came out.

Dr. **Cooper**. We are precisely at the point that we should be this year to hold the schedule that we told the committee we would meet last year, without saying what the dollars are.

Senator **Levin**. So last year and the year before we said we would be spending a certain amount of dollars by 1985 and we are spending those dollars and asking for those dollars?

General **Russ**. To answer you precisely, the answer would be no, we are not asking for the same amount of dollars because there is bound to be a change in the inflation factors and everything, so we do not have the exact number.

What Dr. Cooper is saying is that we are asking for all the dollars we need to maintain the program on the schedule which we signed up to. And more dollars would not help it.

Senator **Levin**. Is there any reduction in dollars in this budget over what we projected you would be asking for last year?

Senator **Warner**. What is the antecedent—Stealth?

Senator **Levin**. Yes, relative to Stealth.

General **Russ**. I will just give you a general comment because I think we had best talk about this——

Senator **Levin**. I do not want to go into the numbers.

General **Russ**. In general, all of the Stealth programs are funded to the maximum amount that they require to do the program which we have briefed the Congress on. Now there are various changes because some of them have had some different program decisions that were made in the program, but none of them affect the overall schedule of the program.

Senator **Levin**. Is it fair to say that—well, let me give you a preliminary. I have heard from one source—and I am not saying that it is particularly reliable or that I believe it, I would like not to—that there has been some shift of dollars from Stealth to other programs.

General **Russ**. That is not true.

B-1B BASING

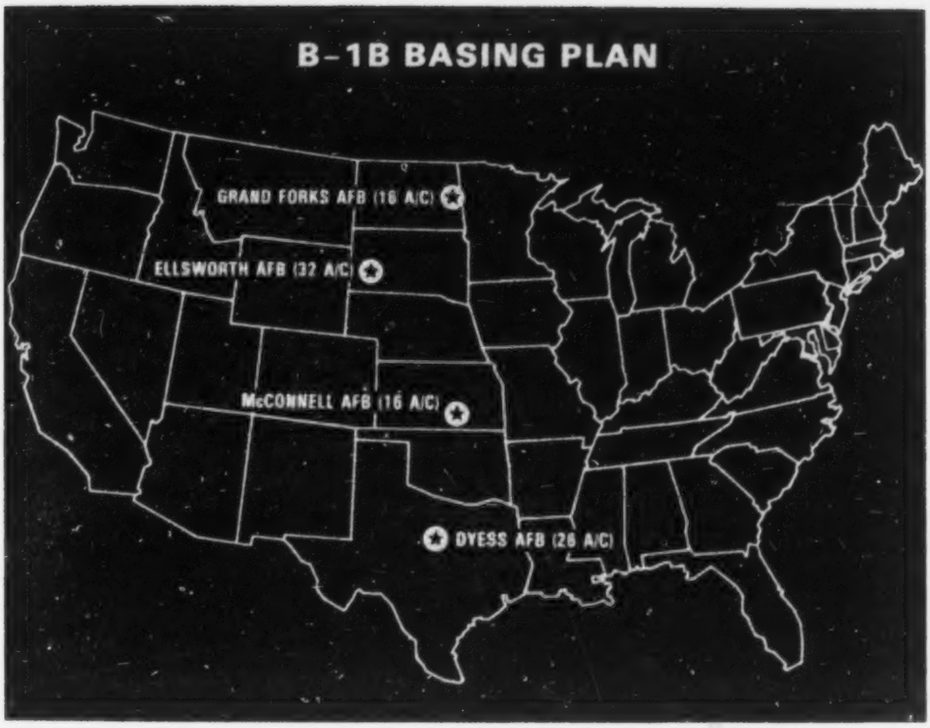
Senator **Levin**. One last question, Mr. Chairman, on the B-1B basing. I am shifting back and forth to B-1B just to make you earn your pay here this morning.

On the B-1 and the basing of those bombers, there have been some allegation that those bombers are based partly on political considerations.

Dr. **Cooper**. No, sir. Those are not based on political considerations. General Gorton covered that this morning, and let us show you where we do have the bases and why.

Senator **Levin**. Well, I do not want to duplicate anything that you have said.

General **Russ**. I think it is an important point because there have been remarks made about that.



General GORTON. As you know, Senator Levin, the bases were announced on the first of February of this year, with Dyess as the primary and first operational base, including training. McConnell will have one squadron, Ellsworth two squardons, and Grand Forks one squadron.

Those bases were not selected arbitrarily, obviously. One of the primary considerations, as you can see the way they are lined up, basically right in the center of the United States, and that was a particular reason, principally to provide maximum warning time from SLBM launches.

Senator WARNER. You will note that the Chairman of the committee's State is on the east coast.

Senator LEVIN. Are you on the east coast? [Laughter.]

Dr. COOPER. They were not only not selected arbitrarily, they were not selected politically.

Senator LEVIN. We have had some allegations in my home State to the fact that some Senators did not support the B-1B meant that their States would not get the B-1B. Do you want to comment on that?

Dr. COOPER. That is not the case. Let me comment on it since I am the political type. That is not the case, Senator, and from a military point of view, as General Gorton pointed out, you can see why the bases were selected as they were.

General RUSS. I might say, Senator, that I heard that allegation, too. In fact, when it was made, the decision where the B-1's were going to be based had already been made. We made this decision a long time ago. It just had not been made public.

Senator **Levin**. Well, that is not what my people were told. They were told the decision was not made when they came to Washington about 6 months ago.

General **Russ**. I understand that, sir, but if we told everyone that the decision was made, then everybody would want to know what the decision was.

Senator **Levin**. Well, better to be forthright if the decision had been made.

General **Russ**. Let me say I guess I would say that a little different way. The basic positions were put down on where we wanted to base these airplanes. The final decision is not made until the Secretary of Defense signs off on this sort of thing. So legally the decision had not been made, but certainly the Air Force's preference to where they wanted to base it had been made.

Senator **Warner**. Predicated solely on military considerations?

General **Russ**. Absolutely.

Senator **Levin**. And there was no change and that preference was granted in the decision, was it?

General **Russ**. Yes, sir.

Senator **Levin**. In other words, the civilian decision by the Secretary was to carry out the preference of the Air Force?

General **Russ**. They did not change our recommendation.

Senator **Levin**. Fair enough. Are these the only four bases that will be getting the B-1?

Dr. **Cooper**. Yes.

Senator **Levin**. And how many SAC bases are there in the United States?

Dr. **Cooper**. We will count those up in a second for you—on the order of 14.

Senator **Levin**. Could you give us that figure for the record? Our understanding is there are 26 SAC bases.

Dr. **Cooper**. Bomber bases?

General **Russ**. It is a matter of semantics, I think, Senator. We have SAC forces on more bases than that.

Senator **Levin**. I see.

General **Russ**. It depends on who controls the base. As an example, we had a B-52 squadron at Seymour Johnson Air Force Base in North Carolina. That is a Tactical Air Command base. So we will provide you a list of the bases and the forces.

[The information follows:]

SAC Bases

There are 24 SAC bases in the United States:
(1) Fairchild AFB, Washington: B-52, KC-135
(2) Beale AFB, California: KC-135, SR-71, U-2
(3) Castle AFB, California: B-52, KC-135
(4) March AFB, California: KC-135, KC-10
(5) Minot AFB, North Dakota: B-52, KC-135, Minuteman ICBM
(6) Grand Forks AFB, North Dakota: B-52, KC-135, Minuteman ICBM
(7) Ellsworth AFB, South Dakota: B-52, KC-135, Minuteman ICBM
(8) McConnell AFB, Kansas: KC-135, Titan ICBM
(9) Dyess AFB, Texas: B-52, KC-135
(10) Carswell AFB, Texas: B-52, KC-135
(11) Barksdale AFB:, Louisiana: B-52, KC-135, KC-10
(12) Blytheville AFB, Arkansas: B-52, KB-135
(13) Grissom AFB, Indiana: KC-135

(14) K.I. Sawyer AFB, Michigan: B-52, KC-135
(15) Wurtsmith AFB, Michigan: B-52, KC-135
(16) Griffiss AFB, New York: B-52, KC-135
(17) Plattsburg AFB, New York, FB-111, KC-135
(18) Pease AFB, New Hampshire: FB-111, KC-135
(19) Loring AFB, Maine: B-52, KC-135
(20) Offutt AFB, Nebreska: HQ Strategic Air Command
(21) Malmstrom AFB, Montana: Minuteman ICBM
(22) F.E. Warren AFB, Wyoming: Minuteman ICBM
(23) Whiteman AFB, Missouri: Minuteman ICBM
(24) Vandenberg AFB, California: Operational ICBM Testing

In addition, there are major SAC flying units at Mather AFB, California (KC-135s); Altus AFB, Oklahoma (KC-135s): Robins AFB, Georgia (KC-135s); and Seymour Johnson AFB, North Carolina (KC-135s), which are tenants as these bases are "hosted" by commands other than SAC. Little Rock AFB, Arkansas, hosted by MAC, maintains Titan ICBMs. Davis-Monthan AFB, Arizona, hosted by TAC, also maintains Titan ICBMs.

Senator LEVIN. I see. Is it fair to say that many more bases that would have been eligible for the B-1 did not get the B-1 than did get the B-1?

General RUSS. Oh, absolutely.

Senator LEVIN. And the fact that a base did not get the B-1 does not jeopardize the future of that base?

General RUSS. That is true, sir.

Senator LEVIN. Thank you very much, Mr. Chairman.

General SHAUD. Illustratively, Minot, for example, which is located very close to Grand Forks, that is getting the B-1, is also located right in the center of the United States. Certainly this would not threaten the future of Minot, with the B-52H's and the cruise missiles. Wurtsmith has a B-52G unit with cruise missiles today, sir.

Senator LEVIN. That is not jeopardized either, I presume.

General SHAUD. No, sir, it would not jeopardize it.

Senator LEVIN. I want them to hear that back in Michigan.

Can you, for the record, give us the detailed criteria upon which the decisions to base the B-1B in those four locations were made? For the record, could you give those, General?

General RUSS. Yes, sir.

[The information follows:]

B-1B BASING DECISIONS

General RUSS. The detailed criteria for basing the B-1Bs were derived from the "major considerations" listed in the "Base Structure Annex" to the DOD's Manpower Requirements Report for fiscal year 1985, which was submitted to Congress in compliance with Section 302, Public Law 94-361. These major considerations are: operational and training requirements; force deployment; use of multi-mission bases; and future flexibility. The criteria used for B-1B basing are: pre-launch survivability; wartime considerations; facility availability; access to training routes; weather; community support; encroachment; and environment. All candidate bases met the above criteria. Obviously, some bases were more favorable to certain criteria than others. However, there is not specific listing or ranking of bases by criteria per se; rather, the criteria were applied and evaluated using professional judgement, and since the candidate bases did meet all criteria, the survival of the force could best be enhanced by selecting interior bases.

Senator LEVIN. Thank you.

Senator WARNER. Thank you, Senator Levin.

Mr. Secretary, Generals, I wish to compliment you again on the progress that the Department of the Air Force has made in these programs. I wish to personally compliment you and your staff support for being punctual this morning. I regret the Chair was 1 minute late. I wish to thank the staff from this committee that attended today. It was not an easy task to get here promptly this morning.

Mr. Exon communicated with the Chair the fact that he experienced unanticipated problems this morning in his transportation. He is very conscientious about attendance. I might suggest, Mr. Secretary, you contact him and offer him an informal briefing.

Dr. COOPER. We will do that, Mr. Chairman. We would like to do that.

Senator LEVIN. Can the record be kept open?

Senator WARNER. The record will be kept open for the usual period, Senator, during which members of this subcommittee and others may submit questions.

Thank you very much, gentlemen.

[Questions with answers supplied follow:]

QUESTIONS SUBMITTED BY SENATOR JOHN WARNER

KC-135 REENGINING

Senator WARNER. Is the Air Force still convinced that the CFM56 reengining program is the most cost-effective approach to increasing tanker capability, and are you still committed to modifying over 300 aircraft?

ANSWER. Yes; repeated analyses of tanker modernization alternatives have shown the CFM56 to be the most cost-effective alternative. Recent reductions in unit costs have reinforced that conclusion. The Air Force remains committed to modifying over 300 aircraft.

COMMON STRATEGIC ROTARY LAUNCHER

Senator WARNER. How many Common Strategic Rotary Launchers do you intend to procure, when will it first be available, and what aircraft will be equipped with CSRL?

ANSWER. The Air Force intends to procure 104 Common Strategic Rotary Launchers for the B-52H and B-1B. The first delivery of a CSRL to the field is planned to be 4th quarter fiscal year 1987 to support an IOC of December 1988. The B-52H aircraft will be the first aircraft equipped with CSRL. Eventually the launchers delivered to the B-52H will transfer to the B-1B as operational requirements dictate. The Advanced Technology Bomber will also be equipped with the CSRLs.

SOVIET ABM SYSTEM

Senator WARNER. To the extent that you are able to do so in open session, would you comment on the degree to which the Soviet ABM system around Moscow complicates our targeting plans?

ANSWER. I can comment very little in open session but, in general, defenses always complicate targeting plans. The Soviet ABM system is designed to defend the Moscow area by destroying incoming ballistic missiles. The capabilities of this system, in so far as we know them, are taken into consideration when tactics for the Single Integrated Operational Plan are developed.

Senator WARNER. What is your current assessment of B-1B penetration capabilities, and what is the basis of your assessment?

ANSWER. Department of Defense [DOD] analyses indicate that the B-1B will have excellent capability to penetrate Soviet air defenses. As a result of the combination of low radar signature, high penetration speed, low altitude flight and new electronic countermeasures, Soviet defense engagement opportunities against the B-1B will be severely reduced.

Tests against advanced technology air defenses indicate a high degree of success with these techniques. DOD analyses based on the results of these tests and intelligence community estimates of Soviet air defenses indicate the B-1B will have the capability to penetrate anticipated Soviet air defenses well into the 1990's in a multitude of employment modes, and to perform effectively as a cruise missile carrier and as a conventional bomber into the next century.

B-1B CARRYING CRUISE MISSILES

Senator **Warner**. When do you plan for the B-1B to carry cruise missiles externally? When will it first carry cruise missiles internally?

Answer. The B-1B will be certified to carry cruise missiles by April 1988. Operationally, carriage of cruise missiles will be a function of force structure requirements which are not firmly established at this time.

B-52

Senator **Warner**. What are the current plans for retiring the 90 ALCM-carrying B-52Gs?

Answer. At present, the current Air Force plans anticipate the retirement of the 90 ALCM-carrying B-52Gs coincident with the deployment of the operational Advanced Technology Bomber.

B-52 CONVENTIONAL CAPABILITY

Senator **Warner**. What are the Air Force's plans for providing a long range, conventional capability, and how does the FY85 request fit into those plans?

Answer. The AF currently has 69 B-52G and 35 B-52H aircraft that are modified for internal and external conventional weapons carriage. The B-52Hs will lose their external carriage capability when they are modified for nuclear ALCM carriage in the fiscal year 1986-88 time frame. The B-52Gs will not be modified for ALCM carriage and will be kept in the long range conventional role through the 90s. These 69 B-52Gs can deliver 22 tons of gravity bombs or land/naval mines; 30 of the 69 are being modified to carry Harpoon anti-ship missiles. In addition, the AF is pursuing procurement of a conventional standoff missile for these aircraft. Programs specifically designed to enhance the conventional capabilities of these 69 non-ALCM B-52Gs are broken out separately in the budget. Funding for programs common to the entire B-52G fleet (i.e. maintenance) are not broken out seperately.

Questions Submitted by Senator Barry Goldwater

Senator **Goldwater**. Please outline the current B-1B production and deployment schedule and compare the current schedule to the original or contract schedule.

Answer. The contractors are working towards an internal schedule which provides them with some management reserve so that minor schedule slips will not result in breach of contract. The following chart outlines the deliveries of the first and last B-1B from each production lot.

	Internal schedule	Contractual schedule
Lot I	December 1984	March 1985.
Lot II	June 1985	August 1985.
	February 1986	April 1986.
Lot III	March 1986	May 1986.
	June 1986	September 1986.
Lot IV	June 1986	September 1986.
	April 1987	June 1987.
Lot V	April 1987	July 1987.
	April 1988	June 1988.

DELIVERY DATE

Senator **Goldwater**. How certain are you of the delivery dates of the B-1B to SAC?

Answer. Cost performance and schedule data indicate that the program is ahead of schedule and within cost. There is no adverse trend data to indicate that this situation will not continue to prevail through the deliveries to the Strategic Air Command.

B-1B COSTS

Senator **Goldwater**. What about the B-1B costs? Are we within the program budget? By how much?

What will be the flyaway cost of the 100th B-1B? How does that cost compare to flyaway costs of the L-1011 or the 747?

Answer. The Department of Defense closely monitors the progress of the B-1B program through various cost performance reporting techniques. All production cost variance data are favorable and no data indicate that this trend will be reversed. Therefore, we are confident that the B-1B program is operating within its budget. However, we are just beginning to track production Lot II data (seven aircraft) and believe it is premature to predict a specific underrun at this time.

The recurring flyaway cost of the 100th B-1B is approximately $90 million 1981 $). Both the L-1011 and the 747 are commercial airliners whose flyaway costs are not available to us.

If comparable costs could be derived between the military and civilian cost accounting sectors in defining flyaway costs, we are certain the B-1B would be substantially higher due to the complexity of the avionics (defensive avionics in particular), nuclear hardening, automatic low level/high speed flight requirements, radar cross-section reductions, and limited number of aircraft purchased.

ATB

Senator **Goldwater**. I realize that for national security reasons the ATB is a sensitive subject, but I want to turn for a moment to public statements made recently by Air Force leaders. General Lawrence. A. Skantze said that he couldn't "predict a specific year" for ATB delivery. The general claimed this was based on the fact that the technologies involved weren't "mature." The best estimate for ATB delivery was somewhere in the early 1990s.

Is this now the best estimate we can come up with for a delivery date for ATB?

Then we have, essentially an uncertain delivery date for the ATB based on the fact that we are uncertain about the technology—or a technology that isn't "mature"?

Answer. The absence of a specific ATB delivery date in General Skantze's public remarks was due not to the lack of a well-defined program. The details of that program, including delivery date, are specially controlled under "Special Access Required" procedures which General Skantze was carefully following. Procedures have been developed to provide this material through the committee staff.

FLYAWAY COSTS

Senator **Goldwater**. If the delivery date is uncertain because of the level of maturity of the technologies, then it would seem that there would also be uncertainty about the flyaway costs.

Do you have a firm fix on the ATB flyaway costs?

Are you as confident in ATB flyaway costs as you are in B-1B costs?

Answer. We do have an estimate for the ATB flyaway costs. While this estimate is less certain than the B-1B estimate due to the stage of the program, the estimate has been reviewed by the OSD Cost Analysis Improvement Group (CAIG).

ATB PERFORMANCE CHARACTERISTICS

Senator **Goldwater**. To what extent are you certain of the performance characteristics of the ATB? Will we be able to flight test a full-size ATB before a procurement commitment is made?

Answer. Details of the ATB program are specially controlled under "Special Access Required" procedures. Procedures have been developed to provide this material through the committee staff.

STRATEGIC MODERNIZATION PLAN

Senator **Goldwater**. There is an article in Aviation Week dated February 27, 1984. On page 16, the author has the Secretary of Defense saying that the ". . . Reagan Administration's strategic modernization plan calls for production of 100 B-1B's and 132 advanced technology stealth bombers." I hope we're not restricting our options by locking ourselves into buying a pig in a poke.

Does this mean that we're committed now to buy 132 ATBs even with great uncertainties about the technology, delivery date, cost, and performance?

Answer. We have not yet committed to a firm production program for the ATB.

DECISION TO PROCURE 100 B-1B'S

Senator GOLDWATER. Isn't the decision to procure 100 B-1B's contingent on our ability to produce a capable, cost effective ATB?

If yes: What is the date by which we must make a decision about producing more than 100 B-1s if we are to avoid the massive costs of reopening a closed B-1 production line? Will we know by that date the cost, performance, and IOC of ATB with a very high degree of confidence?

If no or uncertain: If we're going to procure no more than 100 B-1s no matter what the ability to produce an ATB is, then couldn't we end up with a B-52 fleet that is falling apart, a closed B-1 line, and an ATB that can't be produced because of cost or development problems?

ANSWER. The President's strategic bomber modernization program exploits the synergism inherent in a combined B-1B and Advanced Technology Bomber (ATB) force. By fielding a full B-1B operational capability with 100 aircraft by 1988, we markedly strengthen our strategic nuclear deterrence at a crucial period. In so doing, we allow the time necessary to develop the ATB at the fastest prudent pace for deployment in the 1990s. The Air Force has been diligently implementing this two bomber program since 1981 and can report that both are progressing well. One of the fundamental precepts of the program cited by the President was that building two bombers will stimulate competition. The Air Force has the flexibility to adjust bomber procurement in accordance with any changes in our estimates of the cost and effectiveness of the two aircraft. Fortunately, both programs have been very responsive to this approach, which has resulted in excellent cost and schedule discipline among the contractors. At this point, we expect to field the 100 B-1B force and the ATB force as originally planned.

"TWO BOMBER PROGRAM"

Senator GOLDWATER. The Air Force has claimed that the "two bomber" program adds an element of competitiveness. I am all for that. I see that it's apparently working for the B-1 side of the program. But how will the ATB contractors feel the competitive pressures if the B-1 line is closed down years before we can even get an ATB operational?

Wouldn't the fact that we would be stuck with antique B-52s, no prospect of getting more than 100 B-1s leave us at the mercy of the only other game in town?

ANSWER. One of the fundamental precepts of the two bomber program cited by the President is that building two bombers will stimulate competition. It gives the Defense Department the flexibility to adjust bomber procurement in accordance with any changes in our estimates of the cost and effectiveness of the two aircraft. Fortunately, both programs have been very responsive to this approach to date, which has enabled us to maintain excellent cost and schedule discipline among the contractors. The advanced technology bomber development program is proceeding on schedule and at the fastest prudent pace.

QUESTIONS SUBMITTED BY SENATOR CARL LEVIN

AF COMMITMENT TO BUY

Senator LEVIN. Is the AF still committed to buying no more than 100 B-1Bs and the same number of Advanced Technology Bombers as was originally testified to Congress?

ANSWER. The Department of Defense is solidly behind The President's Strategic Modernization Program, which was described in October 1981. In that announcement, President Reagan declared his intent to deploy 100 B-1Bs and to develop an Advanced Technology Bomber for deployment in the 1990s. There is no change to that program.

B-1B AND B-1C'S

Senator LEVIN. Is any organization within the Air Force and/or DOD considering proposing that more than 100 B-1B be procured, or that a B-1 version with a reduced radar cross section, the B-1C, be procured? What number of additional B-1Bs or B-1Cs is being considered, at what cost in current dollars and during what fiscal years?

ANSWER. The Department of Defense and the Air Force are solidly behind the President's Strategic Modernization Program, which was described in October 1981.

In that announcement, President Reagan declared his intent to develop 100 B-1Bs and to develop an Advanced Technology Bomber for deployment in the 1990s. There has been no change to that program.

ADVANCED PROCUREMENT FUNDS

Senator LEVIN. Has the AF put any funds in its 1986 budget for advance procurement for more than 100 B-1Bs or for the B-1C? If so, how much and in what program elements?

ANSWER. There is no advance procurement funding for more than 100 B-1Bs or for a follow-on derivative of the B-1B in the current budget or in the Five Year Defense Plan.

SLOWED B-1B PRODUCTION RATE

Senator LEVIN. The AF has testified that if the production rate of the B-1B was slowed in fiscal year 1985 and beyond, it could cost the taxpayers a large sum of money. There have been reports that that sum could be as large as $14 billion. Upon what detailed cost, legal and schedule assumptions is that based? Has the AF discussed such assumptions with its B-1B contractors and do they agree with the AF? Provide specific details for the record, as well as the contractual provisions which would justify this cost estimate.

ANSWER. The B-1B program was designed to deliver 100 B-1Bs to the Air Force as efficiently and cost effectively as possible. The first B-1B delivery was planned for fiscal year 1985 with a production buildup to a rate of four B-1Bs per month in early fiscal year 1987. To deviate from the optimum production schedule of four B-1B per month will increase the overall cost of the program.

Our latest preliminary planning estimate for slowing the production rate is that it will cost approximately $4-6 billion (TY $) more than the current program, depending on the rate.

Several assumptions were made in arriving at that estimate. First, Multiyear Procurement (MYP) savings were assumed lost since an important element in the MYP negotiations is the confidence the contractor have in the stability of the program. By eroding this confidence we will lose our leverage in these negotiations, which will result a loss in projected MYP savings.

Second, the production rate of four aircraft is the most efficient rate for the program facilities and production capability. A reduction to a three aircraft per month rate will result in production inefficiencies and revised learning curves.

Third, an increase in recurring production costs will result in a commensurate increase in the cost of spares. The increase will be further compounded by the loss of projected MYP savings derived from our initiatives to integrate the purchase of initial spares with production items.

Finally, once the $20.5 billion baseline is breached, there will be increased pressure to include engineering change order changes that we are now successfully resisting. Experience has shown that longer production runs result in requirements "creep".

To improve this estimate for budgetary purposes would require the Air Force to formally task the contractors to provide cost estimates detail keyed to a hypothetical production rate. This tasking would involve the expenditure of resources outside the baseline.

CEASING PURCHASE OF B-1B

Senator LEVIN. Did the Secretary of Defense recently inform AF leaders—officially or unofficially—to cease any activities, studies or consideration regarding purchase of more than 100 B-1Bs or procurement of B-1Cs? When did this occur, and in what form did the Secretary deliver this message?

ANSWER. On February 23, 1984, the Vice Chief of Staff of the Air Force, General Skantze, held a news conference to reaffirm the Department of Defense's support for the two bomber program instituted by President Reagan in October 1981. The reason for this news conference was to clarify confusion caused by recent articles in the media.

Paraphrasing General Skantze's remarks, he stated that the Department of Defense is solidly behind The Reagan Strategic Modernization Program, which is to deploy 100 B-1Bs and to develop an Advanced Technology Bomber for deployment in the 1990s.

There has never been an alternative program to purchase more than 100 B-1Bs or a derivative of the B-1B.

B-1B RADAR CROSS-SECTION

Senator **Levin**. Is it technically feasible and cost effective to reduce the B-1Bs radar cross-section to that equaling the Stealth bomber? Without disclosing Stealth techniques, what limitations to the B-1B would prevent such a reduction?

Answer. To maximize the advantage of stealth technology, one has to begin with a new aircraft design. By taking a more conventionally designed airplane like the B-1B, fundamental limitations exist as to how much you can do to reduce the radar signature. The geometry of existing designs simply does not provide the optimum characteristics of advanced technology concepts.

ASSIGNMENT TO OTHER SAC BASES

Senator **Levin**. To what other SAC bases will the B-52 bombers and KC-135 tankers displaced by the B-1B beddown be assigned? What will be the criteria for such assignment (provide specific details), and when will those decisions be made?

Answer. The first B-1B base is Dyess AFB, Texas, and the B-52Hs presently assigned to Dyess will be relocated to Carswell AFB, Texas; Minot AFB, North Dakota; and K.I. Sawyer AFB, Michigan. No firm decisions have yet been made on the assignment of the displaced aircraft from the second, third, or fourth B-1B bases. These decisions will be made and announced in conjunction with the submission of the President's Budget for the year that funds will be requested to support these moves. The same basic criteria, which were used for the B-1B beddown, will be applied to these future basing decisions; however, unforeseen changes could result in modifications to these criteria.

B-52 FORCE STRUCTURE CHANGES

Senator **Levin**. Late last year, there were reports that it had been decided by either the Office of the Secretary of Defense or the AF to prematurely retire some B-52s beginning in 1987. Is this report accurate, and if so, what are the detailed justifications for such a decision, including cost savings, operational considerations, targeting requirements, etc.? If not accurate, can you assure this subcommittee that such a proposal is no longer contemplated?

Answer. Late last year, the Air Force was directed to begin phase-out of the ALCM carrying B-52Gs earlier than previously planned. That direction was subsequently modified and the Air Force is currently planning to begin phase-out of these aircraft as the operational Advanced Technology Bomber (ATB) deploys. By retiring ALCM Gs as the ATB deploys, we can provide a logical orderly transition of the pure penetrator mission from the B-1B to the ATB. The B-1B then assumes the ALCM-carrying mission of the retiring ALCM B-52Gs. This orderly transition of mission responsibility best meets the increasing Soviet threat and stresses to the maximum extent Soviet defenses. All plans remain contingent upon continued funding support, but we can assure you the current Air Force program does not retire B-52s beginning in 1987.

B-52 G'S AND H'S

Senator **Levin**. Last year, Secretary Weinberger testified that our B-52Gs would continue to operate into the 1990s and that the B-52Hs would be operational in the SAC inventory for years after the B-52Gs were retired. Is this still accurately reflected in DOD plans and AF plans? Provide tentative retirement dates for the first B-52Gs and Hs and the reasons for those dates, if these dates have been established. Explain any changes to the situation as Secretary Weinberger testified.

Answer. Secretary Weinberger's statement last year was accurate and is still accurate today. The Air Force is currently planning to begin phase-out of the ALCM B-52Gs as the operational Advanced Technology Bomber (ATB) deploys. By retiring ALCM Gs as the ATB deploys, we can provide a logical, orderly transfer of the prime penetration mission from the B-1B to the ATB. The B-1B then assumes the ALCM mission of the retiring ALCM B-52Gs. The Non-ALCM B-52Gs, which will be used in the conventional role, and the B-52H aircraft will remain viable assets, continuing their effectiveness well into the 1990s. This orderly transition of mission responsibility best meets the increasing Soviet threat and stresses to the maximum extent Soviet defenses.

PLANS FOR RETENTION OF B-52 FORCE

Senator **Levin**. Please describe for us the Air Force's current plans for the retention and use of the B-52 force, both G and H models.

Answer. Current Air Force plans anticipate that ALCM-carrying B-52Gs should begin to phase-out as the operational Advanced Technology Bomber (ATB) is deployed. The Non-ALCM B-52Gs which will be used in the conventional role, and the B-52H aircraft will remain viable assets, continuing their effectiveness well into the 1990s.

FUTURE BOMBER MIX

Senator **Levin.** How does the future bomber mix—the remaining B-52s plus the 100 B-1Bs—compare with the number of bombers or bomber weapons we are proposing at START?

Answer. The programmed bomber mix of B-52s and B-1Bs does not exceed the number of bombers or bomber weapons proposed by the United States at START. Any future U.S. START proposals will be structured to include a viable bomber/weapons mix.

B-1B PRODUCTION FACILITIES

Senator **Levin.** When the 100 aircraft buy of the B-1B is completed, what plans does the Air Force have for utilization of the substantial facilities that have been built there?

What percentage of the contractor's peak workforce do you estimate would be involved in these follow-up plans?

Answer. There are no definitive plans for the facilities or workforce involved in the production of the B-1B at this time.

ADVANCED TECHNOLOGY BOMBER

Senator **Levin.** In March 1982's issue of Armed Forces Journal, Under Secretary of Defense (Research and Engineering) Dr. Richard DeLauer said in an interview that the future U.S. bomber fleet "we would like to have" would be "about 100 B-1s and about 132 ATBs." Is it not true, then, that the Air Force will buy more Stealth bombers than B-1Bs?

Answer. The President's two-bomber decision in 1981 included a bomber force structure for planning purposes. That planned force structure is continuously adjusted in response to the threat and arms control initiatives. We have not yet committed to a firm production program for the ATB.

SOVIET SLBM THREAT

Senator **Levin.** What changes in basing plans for the bomber force does the Air Force intend to implement if the threat from the Soviet Delta submarines near our shores continues?

Answer. The Air Force has already taken some steps concerning basing in light of the Soviet Sea Launched Ballistic Missile (SLBM) threat. For example, B-52s have moved from several coastal bases (Beale and March AFBs, California; Seymour Johnson AFB, North Carolina; and Robins AFB, Georgia). In addition, physical improvements have been made at some bases to enhance bomber launch time. The Soviets have SLBM coverage of our bomber bases now; moving Delta submarines near our shores will not change this fact. The Air Force will continue to take the steps necessary to enhance the survivability of the bomber fleet as the Soviet threat evolves. These steps will consider operational factors, wartime requirements, fiscal reality, as well as the total threat environment.

ADEQUATE AMOUNT OF BASES

Senator **Levin.** Given the reduced escape times at even the most inland SAC main operating bases, do we have enough bases for the bombers and tankers?

Answer. While the escape time for our bases is less when comparing the SLBM threat to the ICBM threat, at the present time, there are an adequate number of bomber and tanker bases. This fact could change in the future, depending on the total strategic bomber and tanker force structure, as well as changes in the threat.

ALERT TANKERS

Senator **Levin.** Does SAC plan to base alert tankers at bases other than alert bomber bases, in order to maximize surviving tankers?

Answer. SAC presently bases alert tankers at bases other than alert bomber bases, in order to maximize surviving tankers. SAC also plans to continue this type of basing plan in the future.

B-1B PREPLANNED PRODUCT IMPROVEMENT

Senator Levin. The "Carlucci Initiatives" recommend an evolutionary approach to upgrading system capability. This approach, called preplanned product improvement (P^3I), was to minimize technological and cost risk and enhance fielded performance through the deployment of upgrades. The basic design and make-up of the B-1B bomber has been maintained throughout the program to date. Cost constraints will probably continue to restrict changes and/or upgrades in the B-1B program. Nevertheless, a progress report on the implementation of the "Carlucci Initiatives" showed the B-1B program as having a (P^3I) program.

Has the Air Force in fact initiated a P^3I program for the B-1B?

Answer. Pre-Planned Product Improvement (P^3I) was integrated into the design activity and management concepts used on the B-1B program. The B-1B effort, while adhering to the baseline certified by the President to Congress, is sensitive to candidate enhancements that could become future requirements. The B-1B Program Office management approach includes careful consideration of all potential changes and appropriate planned improvement provisions in the baseline program.

B-1B IMPROVEMENTS AND ENHANCEMENTS

Senator Levin. Describe the improvements or enhancements being considered for the B-1B that are either a part of or outside of the B-1B P^3I efforts.

Answer. At B-1B program initiation in 1981-82, a careful analysis was made of the B-1B mission requirements, postulated threat changes, and employment concepts. Provisions for growth were made in the baseline program to reduce the risk and cost of upgrading the B-1B should mission factors dictate. Some improvements under consideration are the installation of a second Inertial Navigation System, a Forward Looking Infrared System, and Low Frequency/Very Low Frequency Receivers.

B-1 P^3I EFFORT COST

Senator Levin. Provide an estimate of the cost (current and constant fiscal year 1981 dollars) to develop, acquire, and install these improvements along with a tentative schedule. Are these costs in the original $20.5B B-1B program estimate? If not, where are they in the fiscal year 1989 DOD program?

Answer. The space and weight provisions for these items were planned early in the program and were called out in the statement of work to the contractors. Consequently, the costs for these provisions are included in the program, but they are not separately identified in either the B-1B budget or in the contractors' cost accounting systems. These provisions are in the configuration baseline of each aircraft. Since there are no plans to incorporate these improvements in the foreseeable future, the B-1B Program Office has not costed the development, procurement, and installation of these items. There are no Class IV or V modification funds in the Five Year Defense Plan for enhanced capabilities in the B-1B.

START OF P^3I PROGRAM

Senator Levin. If the Air Force has not yet started a P^3I program for the B-1B, why was it reported in a progress on the Carlucci Initiatives, and when do you plan to start one?

Answer. Pre-Planned Product Improvement (P^3I) was integrated into the design activity and management concepts used on the B-1B program. The B-1B effort, while adhering to the baseline certified by the President to Congress, is sensitive to candidate enhancements that could become future requirements. The B-1B Program Office management approach includes careful consideration of all potential changes and appropriate planned improvement provisions in the baseline program.

RESPONSIBLE AF ORGANZIATION

Senator Levin. Which Air Force organization is responsible for managing a B-1B P^3I program?

Answer. The B-1B Pre-Planned Product Improvement (P^3I) program is integral to the B-1B program. the B-1B Program Office manages the development and production of the improvement provisions which are in the baseline configuration.

MULTIYEAR PROCUREMENT SAVINGS

Senator LEVIN. In their fiscal year 1983 supplemental funding request, the Air Force stated a need for an expanded advanced buy of long lead times to begin no later than April 1983. This expanded advanced buy was necessary to protect the $800 million (fiscal year 1981 dollars) savings projected from multiyear procurement. The Air Force claimed savings would rapidly diminish if the Congress did not quickly approve the expanded advanced buy. The Air Force stated that by October 1983 one-half of the $800 million savings would be lost. Approval of the expanded advanced buy was delayed and contracts were let in August, only two months prior to the point when 50 percent of the savings would be lost. What is the current Air Force projection of savings from multi-year procurement? (fiscal year 1981 and TY dollars)

Provide the distribution for this new savings estimate between the four associate contractors. (fiscal year 1981 and TY dollars)

ANSWER. Data provided by the B-1B Program Office during congressional review of the fiscal year 1983 Supplemental Appropriations request indicated that as much as 50 percent of potential multi-year procurement (MYP) savings could be lost if the start of expanded advance buy were delayed until October 1983. These data were based upon associate contractor inputs at that time concerning required turn-on dates for key subcontract items. Several factors have contributed to the preservation of our MYP savings projection:

(1) B-1B associate contractors and their vendors are firmly committed to the program. Continued favorable congressional support has significantly enhanced program credibility within the aerospace industry. As a result, B-1B associates and vendors have been willing to preserve MYP savings by absorbing administrative lead times factored in previous estimates.

(2) Market conditions have improved, resulting in lower prices for raw materials and shortened lead times.

(3) Favorable cost/schedule performance for full-scale development and initial (Lot I and II) production contracts have reduced the associate contractor's perceived risk in out year program costs.

B-1B BASELINE ADJUSTMENT

Senator LEVIN. If the new savings estimate is less than $800 million (1981 dollars), will the B-1B baseline be adjusted? If not, explain how the Air Force will make up for any lost savings?

If the current savings estimate remains at $800 million (1981 dollars) explain why it was not impacted by the delay in starting the expanded advanced buy?

ANSWER. In the spring of 1983, the Department of Defense formally requested a Supplemental to the fiscal year 1983 Appropriations bill. At that time, the B-1B Program Office had firm contractor proposals which supported the reasonableness of the projected Multiyear Procurement (MYP) savings. These proposals, however, were based on an April 1983 Expanded Advance Buy (EAB) start. Congressional approval for EAB was not received until August 1983, at which time initial EAB contracts were awarded and revised MYP proposals were solicited.

As of this date, the B-1B Program Office has received revised MYP proposals from three of the four associate contractors. The Rockwell International proposal is expected in late March 1984. Preliminary analyses of proposal data continue to support the reasonableness of the projected MYP savings.

OFFENSIVE RADAR

Senator LEVIN. The Air Force cited the terrain following radar as having the highest development priority of any single subsystem. The B-1B Program Office claims this radar is 60-70 percent common with the F-16 radar. According to Defense officials, Westinghouse is nine months behind schedule on the F-16 radar and about six weeks behind on the B-1B program. An extensive amount of time is required for development, test, and evaluation of a terrain following radar. For example, the old B-1A radar underwent about four years of testing.

The radar was only recently delivered to the AF according to reports. When will Westinghouse catch up to the original schedule? Are there additional costs to this delay? Who pays and is it above the $20.5B baseline? If not, why not?

ANSWER. Westinghouse is behind some of their internal lower tier schedules. The deliveries to the government are still in line with meeting the major milestone of flight test. Continuous high level Air Force attention is being given to the B-1B radar development. The Air Force expects the radar, including the terrain following mode, to be delivered on schedule to meet the start of the flight testing in July 1984. There are no additional costs.

TESTING TO VALIDATE NEW RADAR

Senator **Levin**. Will it take extensive testing to validate this new B-1B radar? If the effort does not return to schedule, what impact will there be on the B-1B program? Will the Air Force be able to complete testing, especially testing of the terrain following mode, by IOC? Explain or provide test plans for this subsystem.

Answer. The B-1B developmental and initial operational test and evaluation flight test programs entail a 57 month flight test effort. Within this period, B-1B test planners have allocated 225 B-1 flight test hours for Offensive Radar System (ORS) test and evaluation. B-1A number 4 has been designated as the primary avionics test bed and will fly a 135 hour ORS flight test program. B-1B number 1 will be employed for 90 hours of ORS testing. This is consistent with experience gained on similar avionics test programs and is considered entirely adequate for a radar of this complexity.

Prior to B-1B flight testing, the ORS will undergo engineering and development testing at Westinghouse's ground test facility, the System Development Laboratory (SDL) at Boeing Military Airplane Company (BMAC) and the Integrated Facility for Avionics System Test at Edwards AFB. Additionally, Westinghouse will fly a 150 hour engineering flight test program on their own aircraft to further minimize development risk. Flight mode software will be subjected to engineering evaluation and checkout at the BMAC SDL prior to release for integration at the system level.

Current slips in Westinghouse's ORS deliveries are within program schedule margin. Flight test completion and Initial Operational Capability (IOC) dates are unaffected. Current flight test planning allows for adequate test and evaluation of the terrain following mode prior to IOC.

INTERIM CONTRACTOR SUPPORT

Senator **Levin**. Interim Contractor Support (ICS) is planned for two years at the intermediate level and 3 years at the depot level. Recent developments in the program indicate this may change.

What are current plans for ICS on the B-1B program? Also, provide the basis or reason for needed ICS.

Answer. The Interim Contractor Support (ICS) period is still planned to last approximately two years for intermediate level and three years for depot level maintenance. Transition to maximum organic support will be made when technically, economically, and operationally practical.

When the B-1B program was initiated in January 1982, the development and production programs were well established because they were able to benefit greatly from the original B-1A program. However, since logistic support resources had been largely deferred in the B-1A program, ICS will be needed until development, procurement, and delivery of support resources can be provided to support the aircraft delivery schedule.

The B-1B ICS program will provide selected intermediate level and depot level repair capabilities from delivery of the first B-1B aircraft to the Strategic Air Command (SAC) until SAC and Air Force Logistics Command achieve organic capabilities. ICS is not planned for organizational level maintenance since a full Air Force organic capability is planned for this maintenance level beginning with receipt of SAC's first aircraft. The engine is planned for all level organic support with first aircraft delivery.

ICS COSTS ON B-1B PROGRAM

Senator **Levin**. Provide an estimate of ICS costs by level of maintenance support (organic, intermediate, depot) in fiscal year 1981 and TY dollars. How does this differ from original estimates?

Answer. Interim Contractor Support (ICS) costs are not broken down by Air Force maintenance levels of organization, i.e., organizational, intermediate, and depot.

The ICS funding profile for the B-1B, as described in the 1985 President's budget, in millions of dollars is as follows:

	Fiscal year 1981 dollars	TY dollars
Fiscal year:		
1983/P	0.0	0.0
1984	12.9	15.6
1985	36.6	46.6

The 1984 President's budget had $4.4 million (TY $) or $3.6 million (fiscal year 1981 $) in fiscal year 1984 with no funding in the earlier years.

LEARNING CURVES

Senator **Levin**. The B-1B Program Office cost estimate included a 79 percent learning curve for the airframe and a 92 percent learning curve for avionics. The independent cost analysis groups of both the Office of the Secretary of Defense and the Air Force predicted a much lower learning rate than the program office. Learning curves negotiated for Lots I and II were at a lower rate than estimated, but lower wage rates kept negotiated figures close to the estimate.

What rate of learning has been experienced to date by the contractors' Lot I and II efforts?

Answer. As of this date, Lot I is approximately 50-60 percent complete and Lot II is less than 15 percent complete. As a result, it is not meaningful to discuss actual learning experienced to date on B-1B production contracts. All associate contractors, however, are experiencing favorable cost performance on work completed to date.

RATE OF LEARNING

Senator **Levin**. What rate of learning is being proposed by contractors in their annual and/or multiyear contract proposals? (Airframe and avionics)

Answer. Multiyear Procurement (MYP) proposal updates for the remaining production buys have just recently been received by the B-1B Program Office from three of the four associate contractors. The airframe contractor will submit a MYP proposal update in late March 1984. Audits, fact finding, and negotiations have not been completed on any of the proposals submitted. Until detailed analyses of proposals are completed, it is not possible to effectively evaluate proposed rates of learning. These analyses will be completed as the B-1B Program Office develops its pre-negotiation strategies/objectives.

HOPES OF NEGOTIATION

Senator **Levin**. What does the Air Force hope to negotiate in terms of learning rates for the remaining annual and multiyear buys?

Answer. Learning curve rates are not specifically negotiated. The Air Force will negotiate prices for the remaining production buys that are fair and reasonable for the proposed effort. Effective rates of learning resulting from these negotiations will be supported by contractor/industry experience.

LOWER WAGE RATES

Senator **Levin**. Since lower rates were the redeeming factor in Lots I and II, can the Air Force expect to negotiate similarly lower wage rates for subsequent B-1B buys? What rates have been proposed and what is the Air Force negotiation position?

Answer. Multiyear procurement (MYP) proposal updates for remaining production buys have just recently been received by the B-1B Program Office from three of the four associate contractors. The airframe contractor will submit a MYP proposal in late March 1984. Audits, fact finding, and negotations have not been completed on any of the proposals submitted. Until detailed analyses of proposals are completed, it is not possible to effectively evaluate proposed wage rates. These analyses will be completed as the B-1B Program Office develops its pre-negotiation strategies/objectives.

ROCKWELL AMORTIZATION OF CAPITAL IMPROVEMENTS

Senator **Levin**. Rockwell has invested a large sum of money to upgrade facilities or build new ones in order to facilitate a more efficient and economical production of B-1Bs.

How much has Rockwell invested in capital improvements for the B-1B program? Show amounts by location and type of improvements.

Answer. As of 31 December 1983, Rockwell International Corporation, North American Aircraft Operations (NAAO) has invested $290 million on capital improvements for the B-1B program. Rockwell anticipates additional capital investments of $125 million for a total program investment of $415 million. Set forth below are the amounts by location and type of improvement:

[In millions]

Location	Expenditures thru 31 December 1983	Expenditures, total program
El Segundo, CA:		
M&E (machinery and equipment	$87.9	$120.3
L&B (land and buildings)	13.6	26.0
Total	101.5	146.3
Palmdale, CA:		
M&E	17.6	39.3
L&B	81.4	85.9
Total	99.0	125.2
Columbus, OH:		
M&E	81.7	113.8
L&B	0	0
Total	81.7	113.8
Tulsa, OK:		
M&E	7.8	29.7
L&B	0	0
Total	7.8	29.7
NAAO totals:		
M&E	195.0	303.1
L&B	95.9	111.9
Grand total	290.0	415.0

ROCKWELL TO AMORTIZE COSTS

Senator **Levin**. Over what period of time will Rockwell amortize these costs? What percent and amount will be allotted to the B-1B contracts? Please show costs by Lot I, II, III, IV, V.

Answer. Rockwell will amortize these costs over varying periods based upon the type of property. Buildings are depreciated over 35 years, building improvements over 20 years, machinery and equipment over 10 years, furniture and fixtures over 10 years, and data processing equipment over 5 years. Rockwell anticipates that nearly 57 percent of the capital investment planned for the B-1B program will be depreciated against the B-1B contracts. It is difficult to determine the investment costs allocated on a production lot basis since lot performance periods include several fiscal years. Shown below are the anticipated expenditures and depreciation expenses for the total program on a fiscal year basis expressed in millions of dollars.

[In millions]

	Fiscal year—							
	1982	1983	1984	1985	1986	1987	1988	Total
Expenditure	$137	$145	$82	$34	$8	$4	$5	$415
Depreciation	8	27	43	47	44	36	30	235

B-1B INTEGRATION WITH ALCM, ACM, AND CSRL

Senator LEVIN. The Air Launched Cruise Missile (ALCM), the Advanced Cruise Missile (ACM), and the Common Strategic Rotary Launcher (CSRL) will be integrated with the B-1B aircraft. The baseline estimate of $20.5 billion (1981 dollars) included $800 million primarily for ALCM integration. Weapons certification has also changed since the B-1B program inception, especially since the decision was made to incorporate CSRL. A major advantage of the CSRL is its ability to carry a wide variety of weapons. Recent CSRL ground rules, however, do not provide for Short Range Attack Missile (SRAM) integration and carriage capability. Has CSRL multipurpose weapons carriage capability been downgraded for the B-1B? If not, when will the SRAM and its follow-on replacement be tested and certified from a B-1B CSRL?

ANSWER. The primary reason for developing a Common Strategic Rotary Launcher (CSRL) was to reduce the number of different launchers for B-52s, B-1Bs, and Advance Technology Bombers. Initially the B-1B will use the CSRL to carry cruise missiles internally, but the potential exists to use this launcher to carry other weapons on follow-on sorties envisioned in a prolonged nuclear engagement.

If the CSRL were loaded with Short Range Attack Missiles (SRAMs), it would occupy the same space as two B-1B 180 inch launches, each having the same SRAM capacity as the CSRL. The SRAM will, therefore, only be integrated and certified in the 180 inch launcher, although the missile is compatible with the CSRL.

The CSRL capability has not been degraded. The CSRL can carry ALCM, SRAM, and a variety of other weapons. A SRAM follow-on, the Advanced-Air-to-Suface Missile, is being developed to be compatible with both CSRL and B-1B 180 inch launcher. How the B-1B will ultimately be loaded is a force structure issue currently being analyzed by the Strategic Air Command and Joint Strategic Target Planning Staff.

$800 MILLION COST

Senator LEVIN. Explain how the $800 million cost, included in the baseline estimate for ALCM integration, will be used.

ANSWER. The $800 million has been, and will continue to be, used for the design, development, testing, fabrication, procurement, assembly, integration and check out of external and internal carriage of the cruise missiles on the B-1B.

The $800 million will also be used to provide for the necessary software development, test support, and logistics support required to integrate cruise missiles on a common strategic rotary launcher.

Most of the full scale development portion of the $800 million is now on contract with Rockwell and Boeing. The production portion of the $800 million is included in the proposals for production Lots III and IV and will be used as those lots are placed on contract.

COSTS INCLUDED IN B-1B BASELINE ESTIMATE

Senator LEVIN. Provide estimates of cost to develop, integrate, incorporate, retrofit, etc., ALCM, ACM, and CSRL into the B-1B. Show both costs included in the B-1B baseline estimate and those outside the baseline and their budgetary source (Program Element Numbers). (fiscal year 1981 and TY dollars)

ANSWER. The $800 million fiscal year 1981 $) has been, and will continue to be, used for the design, development, testing, fabrication, procurement, assembly, integration and check out of external and internal carriage of the Air Launched Cruise Missile (ALCM) for the B-1B. The integration of the Common Strategic Rotary Launcher (CSRL) into the B-1B will be accomplished within the $800 million. The $800 million will also be used to provide for the necessary software development, test support, and logistics support required by the integration of the ALCM/CSRL capability.

Most of the full scale development portion of the $800 million is now on contract with Rockwell and Boeing. The production portion of the $800 million is included in the Lot III–IV proposals and will be used as those lots are placed on contract.

Details of the Advanced Cruise Missile program are controlled under "Special Access Required" procedures. Procedures have been developed to provide this material through the Committee staff.

ADDED WEIGHT OF ACM

Senator **Levin**. The B–1B will be designed to carry the new ACM. The ACM will be heavier than the ALCM in order to achieve increased range. How will the added weight impact the stress and fatigue of the B–1B airframe and wings? Will this ACM carriage not require additional fatigue testing for the B–1B? If additional testing is required, when will it be done, on which aircraft, how much will this testing cost, how long will it take, and will it be funded within the B–1B baseline estimate?

Answer. The following unclassified discussion addresses only the structural capability of the B–1B hard points for external stores and does not imply any information about the Advanced Cruise Missile (ACM) weight or performance. Each B–1B dual pylon hard point has been designed to carry 8,000 pounds. No identified B–1B external stores combination exceeds that limit. No changes to the B–1B gross takeoff or in-flight weight have been made as a result of ACM carriage. Therefore, the static and fatigue requirements for the B–1B airframe have not changed. Static and fatigue structural testing and dual pylon testing will be accomplished to the worst case AGM–86B or ACM configuration.

B–1B COSTS

Senator **Levin**. Provide the current estimate of all B–1B costs and a corresponding description of the effort. Costs should be broken out by baseline and non baseline efforts and be in fiscal 1981 dollars. Appropriate program element numbers should also be provided.

Answer.

B–1B BASELINE COSTS IN FISCAL YEAR 1981 DOLLARS

[Billions]

Title	Appropriation codes	Program element	Total
Weapon system	3010	11126F	16.7
Initial spares	3010	11126F	1.1
RDT&E	3600	64226F	2.7
Total program			[1] 20.5

[1] As of the 1984 Department of Defense Appropriations bill, 50 percent of the total program cost of the B–1B has been appropriated by Congress.

Items that are associated with the B–1B and not normally carried in the weapons system line include:

Title	Appropriation codes	Program element	Total
Aircrew simulator	3010/3600	11126F/64227F	0.3
Engine component improvement program	3600	64268F	.1
Depot maintenance (includes all interim contract support)	3400	72207F	.1

The last year of funding reported with these associated costs is fiscal year 1986; whereas, the baseline funding extends from fiscal year 1981 through fiscal year 1988. In addition, we have started to fund the replenishment spares needed to operate the airplane. Replenishment spares funding continues throughout the life of the program. Currently, we have $0.2 billion for replenishment spares through fiscal year 1986.

KC-135 TANKER REENGINING

Senator **Levin**. I note you are requesting funding for 50 KC-135 reengine kits in fiscal year 1985, up from 29 this year, and plan to increase the number to 65 in fiscal year 1986. What is the rational for this increased rate? We don't seem to be getting those any cheaper, despite the higher volume.

Answer. The Air Force is requesting funding for 53 KC-135R modification kits in fiscal year 1985. The program was planned to ramp up to an optimum production rate of 72 aircraft per year as rapidly as funding constraints would allow. The primary reason for the increased rate is the critical air refueling shortfall during the late 1980s time frame.

The unit cost of the KC-135R has shown a significant decrease from 1983 to 1984. The December 1983 Selected Acquisition Report reflects a nine percent unit cost decrease (in constant fiscal year 1981 dollars). Programmed funding for the 53 KC-135R kits was reduced by $140 million within the Air Force prior to submission of the fiscal year 1985 President's Budget following highly successful contract negotiations for the fiscal year 1984 lot.

[Whereupon, at 10:42 a.m., the subcommittee adjourned, to reconvene upon the call of the Chair.]

DEPARTMENT OF DEFENSE AUTHORIZATION FOR APPROPRIATIONS FOR FISCAL YEAR 1985

TUESDAY, MARCH 13, 1984

U.S. Senate,
Subcommittee on Strategic and
Theater Nuclear Forces,
Committee on Armed Services,
Washington, DC.

SEA-BASED DETERRENT

The subcommittee met in open session, pursuant to notice, at 9:05 a.m., in room SR–232A, Russell Senate Office Building, Senator John W. Warner (chairman) presiding.

Present: Senators Warner and Levin.

Staff present: Robert F. Bott, William E. Hoehn, Jr., George K. Johnson, Jr., James C. Smith III, professional staff members; Douglas R. Graham, research assistant; and Karen A. Love, staff assistant.

Also present: Gerald J. Smith, assistant to Senator Goldwater; Jeffrey B. Subko, assistant to Senator Exon; and Peter D. Lennon, assistant to Senator Levin.

OPENING STATEMENT BY SENATOR JOHN W. WARNER, CHAIRMAN

Senator **Warner**. The subcommittee convenes this morning to receive testimony on the various aspects of our sea-based deterrent. Our witnesses today are: Commodore Roger Bacon, Director, Strategic and Theater Nuclear Warfare Division in the Office of the Chief of Naval Operations; Rear Adm. Glenwood Clark, Director, Strategic Systems Projects; Rear Adm. Lawrence Layman, Director, Naval Communications Division; Rear Adm. Stephen Hostettler, Director, Joint Cruise Missile Project; Commodore Thomas Fox, Acting Director of the Strategic Submarine Division; and Dr. Edward Harper, Technical Director of the SSBN Security Program.

Gentlemen, we welcome you. The chair also wishes to note the recent promotion of Commodore Fox and to extend its warm congratulations.

The subcommittee looks forward to your report of progress in carrying out the sea-based portion of the strategic modernization program. The record established here today will assist the subcommittee in supporting recommendations on the overall budget request for strategic programs.

I hope to soon be joined by some of my colleagues and will yield to them as they appear.

[The prepared statement of Senator Strom Thurmond follows:]

STATEMENT OF SENATOR STROM THURMOND

Gentlemen, it is a pleasure to have you here today to receive testimony on our sea based deterrent. As always, Mr. Chairman, you are doing an excellent job in preparing the Record concerning our strategic and theater nuclear forces.

Our sea based strategic forces seem to be the only leg of the Triad left that still possess a large degree of invulnerability, but I am concerned that the Soviets may close that gap quite rapidly at some point.

The United States has discovered that some of our technologies have anti-submarine warfare applications that greatly enhance our ability to detect and track Soviet submarines.

Senator **WARNER**. Gentlemen, each year that we have our strategic hearings—and this is my sixth—I look forward to this hearing as much as any, because I was privileged to work on the early designs of the Trident and so many of the programs that you are carrying on today. So I wait with eager expectation to hear the reports on your progress.

Commodore, will you lead off?

STATEMENT OF COMMODORE ROGER F. BACON, U.S. NAVY, DIRECTOR, STRATEGIC AND THEATER NUCLEAR WARFARE DIVISION, OFFICE OF THE CHIEF OF NAVAL OPERATIONS ACCOMPANIED BY REAR ADM. GLENWOOD CLARK, U.S. NAVY, DIRECTOR, STRATEGIC SYSTEMS PROJECTS; REAR ADM. LAWRENCE LAYMAN, U.S. NAVY, DIRECTOR, NAVAL COMMUNICATIONS DIVISION, OFFICE OF THE CHIEF OF NAVAL OPERATIONS; REAR ADM. STEPHEN J. HOSTETTLER, U.S. NAVY, DIRECTOR, JOINT CRUISE MISSILES PROJECT; COMMODORE THOMAS R. FOX, U.S. NAVY, ACTING DIRECTOR, STRATEGIC SUBMARINE DIVISION, OFFICE OF THE CHIEF OF NAVAL OPERATIONS; DR. EDWARD Y. HARPER, TECHNICAL DIRECTOR, SSBN SECURITY PROGRAM

Commodore **BACON**. Mr. Chairman, I have submitted a detailed statement for the record which I can summarize briefly, with your permission.

Senator **WARNER**. The statements in their entirety will be placed in the record for all witnesses.

Commodore **BACON**. Thank you, sir.

In the past year we have commissioned two more Trident submarines, U.S.S. *Georgia* and U.S.S. *Florida*. Both of these ships were delivered 6 weeks ahead of schedule.

The first two Trident submarines, U.S.S. *Ohio* and U.S.S. *Michigan,* together have completed seven deterrent patrols, operating out of their base at Bangor, WA. Their performance during these initial patrols has been excellent.

Nineteen of our 31 older SSBN's continue to operate from Charleston, SC, and the Holy Loch, Scotland. These ships are equipped with the Poseidon C-3 missile. The other 12 operate from Kings Bay, GA, and have been backfitted with the Trident I C-4 missile, which is also carried on our operational Trident submarines. As of today, our submarine force has completed 2,219 strategic deterrent patrols.

During the past year there have been some C-4 missile flight test failures. The problems were primarily in the first stage rocket motor of the missiles. Corrective action has been initiated and later flight tests have been successful.

In our missile program, we completed advanced development of the Trident II D-5 missile, and commenced full-scale engineering development in October of last year. Our goal is an initial operational capability of the Trident II D-5 missile in December 1989. We intend to outfit the ninth Trident ship and subsequent new construction Tridents with this higher yield and improved accuracy missile. The first eight Tridents will be backfitted with the Trident II D-5 missile during their first regularly scheduled overhaul in the 1990's.

As far as our future plans, we believe a continuation of the building rate of one Trident submarine per year is adequate and prudent. We plan to retire the 31 Poseidon submarines as they complete a nominal life of 30 years, unless arms control agreements require otherwise. This retirement would take place in the period of about 1993 to 1999, since they were all constructed in about a 6-year period in the 1960's.

Even with these retirements, the strategic submarine force capability will continue to increase. Introduction of the Trident II D-5 missile will give us the capability to effectively attack hardened or reinforced targets. This full range of capabilities fulfills the mandate of national security policy to deny Soviet war aims should deterrence fail.

With respect to our Tomahawk missile program, we are on schedule to achieve an initial operational capability of the Tomahawk Nuclear Land Attack Cruise Missile [TLAM/N] on surface ships and submarines this summer. TLAM/N provides the theater commander with an increased capability to deter nuclear war through a distribution of offensive fire power with longer range on a large number of ships widely dispersed on the broad oceans of the world.

In addition, TLAM/N is well suited for a post-attack reserve role, to provide a wider range of escalation control options to the national command authority.

I am pleased to report that the Tomahawk cruise missile weapons system is now ready for production. Of a total of 17 tests of all variants to Tomahawk production baseline missiles during calendar year 1983, 15 of these tests were successful.

Our communications program continues to receive high priority attention. Procurement of the E-6A aircraft, which the Navy plans as a TACAMO aircraft replacement, has been reevaluated. These studies confirm the E-6A is required to accomplish the TACAMO mission past the late 1980's.

Finally, we believe that the overall status of our sea-based strategic deterrent force is good. We believe the Navy Strategic Program we are presenting represents a sound balance between the needs of our strategic forces and those of the general purpose forces.

The security and survivability of our sea-based forces continues to be of highest priority. Dr. Harper, technical director of our SSBN Security Program, is prepared to brief you in executive session on our efforts to ensure SSBN survivability.

Senator, that completes my summary. Admiral Hostettler has a statement to add to my summary of my statement.

[The prepared statement of Commodore Bacon follows:]

PREPARED STATEMENT OF COMMODORE ROGER F. BACON, U.S. NAVY, DIRECTOR, STRATEGIC AND THEATER NUCLEAR WARFARE DIVISION IN THE OFFICE OF THE CHIEF OF NAVAL OPERATIONS

Mr. Chairman, gentleman: I am Commodore Roger Bacon, Director of the Strategic and Theater Nuclear Warfare Division in the Office of the Chief of Naval Operations. This division provides a focal point within the Navy to translate the national nuclear policy into supporting Navy requirements, and to assess how well our current and future systems, plans, and policies support our national objectives. I am Admiral Watkins' principal advisor on all policy and planning matters involving nuclear weapons, including arms limitation issues. I appreciate the opportunity to appear before this important subcommittee, and look forward to a continuing close association with you.

Before I discuss the particular details of our sea-based deterrent, I want to focus for a few minutes on why the overall survivability of our retaliatory capability is so important to deterrence. Before the advent of MIRVs and improved accuracy, all strategic forces possessed acceptable degrees of survivability. This is no longer true. Technological advances have raised serious doubts about the ability to maintain survivability of current fixed systems. Because of this development, our sea-based deterrent forces assume greater importance in the period when we are modernizing our overall strategic deterrent forces.

In April of last year, the President's Commission on Strategic Forces, chaired by General Scowcroft, recognized the synergistic interrelationship and diverse contributions of the different elements of the U.S. strategic arsenal. The Commission stressed stability vis-a-vis the Soviet Union as the primary objective not only of force modernization, but also of arms control, with which modernization must be closely interrelated. The inherent and unique survivability of the strategic submarine force plays a key role in achieving that stability.

Survivable strategic deterrent systems accomplish several things. Perhaps the most important is the stabilizing influence they exert in a crisis. Since they cannot be attacked successfully, no rational enemy is likely to expend a large portion of his nuclear offensive capability in some futile attack on the system itself—an attack futile in the sense that it cannot deny the capability to retaliate effectively. In this sense, survivable means non-targetable, and such systems remove or significantly reduce any temptation for a first strike, particularly during a crisis. That's theory; in the practical sense, our non-targetable sea-based systems limit the extortion value of the Soviets' large ICBM force.

For these reasons, among others, the President's Strategic Modernization Program is designed to provide a survivable and effective force which will assure the vitality of deterrence by clearly demonstrating to any state that it has much to lose and little to gain by initiating aggression against the U.S. and its allies.

I do not wish to imply that without nearly perfect survivability a strategic system loses all its value or effectiveness. I do mean that a significant portion of our strategic arsenal must be as survivable as possible. Survivability is just one virtue—albeit an important one—of strategic forces. Survivable forces translate directly into stability in a crisis. Finally, survivability provides us confidence in the effectiveness of our deterrent and makes our strategic policy credible to potential enemies.

Since last year's testimony two more Trident submarines have been commissioned—U.S.S. *Florida* in June 1983, and U.S.S. *Georgia* in February 1984. This brings to four the number of Trident submarines in the fleet. U.S.S. *Florida* will commence her first deterrent patrol this spring, and U.S.S. *Georgia* is conducting shakedown operations on the east coast. The *Henry M. Jackson*, proudly renamed in honor of the late member of this committee, is about a month ahead of schedule, and is expected to be delivered to the Navy in September. The first two Tridents, U.S.S. *Ohio* and U.S.S. *Michigan*, have together completed seven deterrent patrols operating out of their base in Bangor, Washington. These Trident submarines are the most effective warships of their kind in the world today—quieter, faster, and with more firepower than the SSBN's they will replace.

In addition to our Trident submarines, we currently have 31 older SSBN's, built during the 1960's. Nineteen are equipped with the Poseidon (C-3) missile and operate from bases in Charleston, South Carolina, and Holy Loch, Scotland; 12 of the older SSBN's, operating from Kings Bay, Georgia, have been backfitted to carry the Trident I (C-4) missile, which is also deployed on our operational Trident submarines.

The overall reliability of the C-4 missile has been excellent. Some C-4 missile flight test failures occurred during 1983 and prior years, primarily with the first stage motors of the missiles. Corrective action was initiated and later flight tests have been successful. Investigation into all possible causes of the failures is continuing.

Unless required to do so earlier because of arms control considerations, we plan to retire the 31 Poseidon hulls as they complete a nominal life of 30 years. The first will retire in FY 93, the last in FY 99. Even with the retirement of these ships, however, the capability of our sea-based strategic forces will continue to grow. Force effectiveness will take a quantum jump ahead when the new Trident II (D-5) missile enters the fleet in 1989. The D-5 missile will be capable of effectively attacking the full spectrum of potential targets, including "hardened" or reinforced targets. Such a breadth of capability is required in the most survivable component of our strategic forces in order to enhance deterrence and to fulfill our national strategic policy to deny Soviet war aims should deterrence fail.

In October of last year, the Trident II (D-5) weapon system commenced full scale engineering development, with a goal of initial operational capability [IOC] in December 1989. The ninth Trident hull and all subsequent new construction Trident submarines will be initially outfitted with this new missile. The first eight Trident hulls will be backfitted with the Trident II (D-5) weapon system during their first regularly scheduled overhauls in the 1990's. Kings Bay, Georgia, will be the home of the first D-5 capable Trident submarines. An extensive construction program at Kings Bay started in 1982, and is now on a tight schedule to meet the IOC. The Trident Program that is before the Congress reflects President Reagan's Strategic Modernization Program announced in October 1981. It reflects deployment of the Trident II (D-5) missile in 1989 and continuation of building one Trident submarine per year. Although the building rate could be increased, with the long lead times involved in ship construction, we would not be able to realize the results of any increased building rate until 1993 or 1994. Unless there are unforeseen, overriding considerations of national importance with regard to force levels and capabilities, we believe continuation at the rate of one per year is adequate and prudent. The increased capability to be derived from accelerated SSBN construction does not warrant the considerable additional cost.

I stressed earlier the importance of the survivability of our strategic submarines. Maintaining that survivability in the face of ever improving technology is essential to our strategic posture and national defense. It is the objective of the SSBN security program to assure the continuing covert mobility of our SSBN's, required in the fulfillment of their mission of strategic deterrence. This goal takes into account (1) expanding Soviet Anti-SSBN military capabilities that aim to limit the mobility of our SSBN's, and (2) advanced technology that might be exploited by the Soviets to effectively neutralize the covertness of our SSBN's.

The methods used by the SSBN security program to address this objective are twofold:

First, at sea exercises, supported by operations research and in-depth intelligence assessments, identify and solve emergent operational problems that could limit the covert mobility of the SSBN's.

Second, at sea experiments identify potentially feasible techniques that might reduce the effectiveness of the current covert capabilities of the SSBN's. These experiments are supported with technical scientific assessments made by nationally recognized scientists and engineers in industry, academia, and government, using fundamental principles of the natural sciences and drawing on the national technology base.

These two approaches are used in combination with theoretical analyses, laboratory research, computer simulations, and technology advances to provide the knowledge base upon which the covert mobility of the SSBN's can continue to be effective, thus ensuring the mission effectiveness of the force.

As a result, the United States has avoided technological surprise by the Soviets in over 2200 strategic submarine deterrent patrols. All theoretical threats have been examined. This extensive research has not revealed a potential threat to the survivability of the strategic submarine fleet. The premise of the SSBN security program is to stay ahead of the threat, not to react to it. Department of Defense and congressional oversight have sustained the credibility of the program.

The President's Strategic Modernization program also announced the deployment of the Tomahawk Nuclear Land Attack Cruise Missile [TLAM/N] beginning this summer. TLAM/N provides the theater commander with an increased worldwide capability to deter nuclear warfare and to hold at risk targets ashore should deterrence fail. The military utility of TLAM/N arises primarily from the distribution of significant offensive firepower through the deployment of TLAM/N on a large number of existing and programmed Navy submarines and surface ships. TLAM/N enhances deterrence by providing a new threat spectrum to the Soviets through a worldwide strike capability, achieved with minimum risks and costs. In addition, TLAM/N supports our strategic deterrent objectives by contributing to the nuclear reserve force.

The synergism of carrier aircraft and TLAM/N significantly improves the carrier battle group's flexibility and effectiveness. The increased strike range of a larger number of surface platforms operating under carrier air cover and independent, covert, forward-deployed submarines presents the Soviets a formidable threat. Of importance is that the entire battle group will now have a long range strike capability, and Soviet firepower cannot concentrate on the carrier alone.

TLAM/N dispersed on large numbers of naval platforms results in a survivable and enduring force which will add considerably to our nuclear reserve force. It will also provide an increase in the range of escalation control options available to the nation without resort to central strategic systems. TLAM/N can achieve a hard target kill with limited collateral damage. The range and flexibility of the system make it attractive for holding at risk Soviet targets not currently ranged by any non-strategic nuclear system.

I am pleased to report to you today that the Tomahawk cruise missile weapons system is now ready for production. All manufacturers have sufficient capacity, dedicated production lines, greatly improved work instructions, adequate tooling and test equipment, and trained personnel. The transfer of technology between the airframe contractor and the guidance contractor is continuing, and both companies will be ready to compete for the fiscal year 1985 buy of the all-up-round [AUR].

Quality, once a problem, has been given major attention, and this effort has paid off with the outstanding success rate of the 1983 flight test program. Of a total of 17 tests of all variants of the Tomahawk production baseline missiles during the last calendar year, 15 were successful.

The produceability of the Tomahawk design has been proven throughout the production phase. In fact, a technology transfer program has been implemented to fully qualify two manufacturers to produce the Tomahawk design. No major problems have been encountered to date. The rigorous demands placed upon the production baseline missiles during operational evaluation have proven that the Tomahawk missile, now ready for a full production go ahead, is a well-engineered, high quality weapon.

In summary, with the deployment of TLAM/N, the U.S. Navy's long-range nuclear strike capability will be dispersed on over 140 platforms, and will complement the strike capability of the planned 15 deployed carriers by holding at risk large land areas not currently threatened by naval or any other non-strategic forces. This force will substantially enhance deterrence by denying the Soviets any calculus which could lead them to a conclusion that they could attain a favorable outcome from the initiation of hostilities with the U.S. or its allies.

The Navy heartily endorses the top priority given to improvement of strategic command, control, and communications in the President's Modernization Program. Our guiding principle in C^3 modernization is to ensure that the strategic submarine force is responsive to the needs of the national command authority.

The importance of strategic submarine command, control, and communication system improvements was also stressed by the Scowcroft Commission. A key component of this system is the E-6A aircraft, which the Navy plans as a TACAMO replacement. TACAMO is the Navy airborne relay communications system dedicated to providing connectivity between the national command authority and the strategic submarine force. Navy's development and total procurement objectives for E-6A have not changed since last year. Our plans integrate a proven communications suite into a production airframe which is militarized and hardened against electromagnetic pulse. The E-6A TACAMO Program, on contract with Boeing since 29 April 1983, has been the object of intense scrutiny in efforts to reduce total costs or find lower cost alternatives. The Navy has re-evaluated the need for an E-6A airframe. Recent Navy studies confirm the E-6A is required to accomplish the TACAMO mission past the late 1980's, and recent negotiations with Boeing have led to a significant reduction in program cost.

E-6A is one of those connectivity enhancements which are crucial to the continued effectiveness of a key element in our overall strategic deterrent posture. The other two major Navy Strategic C^3 Modernization Programs are the extremely low frequency [ELF] ground-based system, and the extremely high frequency [EHF] satellite system. Both EHF and ELF add significant dimensions to our ability to command and control our submarines. The systems each have their unique attributes, and each complements the other to provide us the greatest degree of flexibility and survivability.

In conclusion, the status of our sea-based deterrent is good. The Navy's Strategic Program represents proper balance between the needs of our strategic forces and those of the general purpose forces. The program could be expanded, but no expansion or acceleration could have an impact before the early 1990's. The Navy does not consider it necessary or desirable to undertake such an expansion. With the introduction of the Trident II (D-5) missile, continued construction of our highly capable Trident submarines, and improvements in C ^{3}, the strategic submarine force will be able to perform our high priority mission.

In his address at the commissioning ceremony of U.S.S. *Georgia* last month, Admiral Watkins underscored the importance of Trident. "This is our Navy's highest priority program, and a cornerstone of our national security policy. With these submarines underway, we provide our Nation with a highly mobile, undetectable security system—a survivable and dependable leg of our national strategic deterrent triad. U.S.S. *Georgia*, and her sisters, will remain our most stealthy system of defense through this decade and beyond, allowing our national leadership time needed to negotiate effective reductions in nuclear arms."

As Admiral Watkins noted, the status of our sea-based deterrent force is sound, and the capabilities and importance of that force continue to grow. In large measure this is a result of the strong support Trident and the other components of our sea-based deterrent have received in the past from the Congress and especially from this committee. I urge you to continue your support for these vital programs.

Thank you.

Senator **Warner**. The committee will go into executive session after we have had adequate opportunity in open session to discuss the issues. The Chair would like to have the opportunity to hear from the witnesses later this morning on the Trident I missile [C-4] failures, as well as the E-6A TACAMO program?

Admiral?

STATEMENT OF REAR ADM. STEPHEN J. HOSTETTLER, DIRECTOR, JOINT CRUISE MISSILES PROJECT

Admiral **Hostettler**. Mr. Chairman, I am Rear Adm. Steve Hostettler, Director of the Joint Cruise Missile Project, and I am pleased to have the opportunity to give you a quick update on the status of the Tomahawk Program. With your permission, sir, and in the interest of time, I would like to enter a formal statement into the record and then here today provide you with only a summary and stand by for questions.

Senator **Warner**. Thank you.

Admiral **Hostettler**. Thank you, Mr. Chairman.

Approximately 12 months ago, I reported to this committee that a number of problems existed in the program at that time. Those included: one, an undesirable flight test success rate; two, we had major production problems at our contract facilities; finally, it was my belief that the quality of the missiles was too low.

I offered a plan to restructure the program which would help resolve these problems, as well as my commitment to meet the initial operational capabilities of all of the Tomahawk variants with reliable weapons systems.

The progress of all of these variants, as well as the readying of their multiple launch platforms, has been, I believe, rapid over the past year. The success rate of Tomahawk flight tests has gone from 44 percent in the July 1981 to January 1983 period, to 88 percent from January 1983 to January 1984.

The quality assurance and production problems at our contractor facilities have either been resolved or are in the process of being resolved, as can be attested to in the results of the flight test program.

As for my commitment to you last year, I am pleased to report that my No. 1 priority was achieved. The ground launched Tomahawk GLCM was deployed in the United Kingdom in December on schedule. We have completed operational test and evaulation of the submarine launched nuclear variant.

We plan to complete this month the operational testing of the surface ship launched Tomahawk nuclear variant, and have both of those variants deployed in submarines and surface ships this summer. We have completed operational evaluation and have commenced deployment of the submarine launched antiship version, called TASM, this past November. We plan to complete our surface ship operational evaluation of the antiship version, or TASM, next month and be ready to deploy that variant in our surface ships by the end of May of this year.

Although much work remains, thanks in part to this committee, which granted the approval for the restructure of this highly significant and complex program about a year ago, we are now well on our way to providing our operators with a long-awaited strike capability.

Thank you, sir.

[The prepared statement of Admiral Hostettler follows:]

PREPARED STATEMENT OF REAR ADM. STEPHEN J. HOSTETTLER, U.S. NAVY, DIRECTOR, JOINT CRUISE MISSILES PROJECT

Mr. Chairman and members of this committee, I am pleased to have this opportunity to come before you today and discuss the status and future plans for the Tomahawk weapon system. I believe this is especially important since the Congress is in serious deliberation regarding the funding of this major weapons system and how we are meeting congressional guidance issued in the fiscal year 1984 Appropriation and Authorization Acts.

During the past year we have made steady progress in correcting many technical and production related problems. My statement today will focus on where we have made improvements and on where we need to continue to correct deficiencies. Also, I want to review our future plans regarding operational testing of the surface ship systems, accuracy testing of the TLAM/C variant, our commitment to dual source production in fiscal year 1985 and provide you with information on quality improvements to the Tomahawk missile family.

BACKGROUND

Approximately 12 months ago if you recall, I reported to this committee that a number of problems existed in this program. It should be noted that neither these problems nor the planned restructure of the program to resolve these problems would affect the Ground Launched Cruise Missile program or the nuclear version of the Sea Launched Cruise Missile Program. Both of these variants were performing successfully in the test program and were on track in meeting their IOC schedules.

The problems that did exist were more in conjuction with the transitioning from development into production and the area of conventional missile performance because of the greater degree of accuracy needed. These problems include:

(1) A less than desirable success rate in the flight test program.

(2) A less than desirable performance level of the Theater Mission Planning System in the planning of conventional land attack missions.

(3) Major industrial production problems existed relating to missile and guidance set manufacturing. These problems were inherent in our production flow. They were induced by entering into high rate production too rapidly. Consequently, the Secretary of the Navy had imposed in December 1982 a rigid ceiling of 4-to-6 missiles per month on missile production until corrective actions were taken by the Program Office and our supporting contractors.

In backdrop to these problems, top priority was given to the Ground Launched Cruise Missile (GLCM) to meet NATO's schedule for the deployment of GLCM in Europe. Additionally, the Sea Launched Cruise Missile (SLCM) program milestones had to be preserved. Therefore, we made a set of commitments to resolve these problems. My priority list was: (1) Insure "Head of the Line" status for GLCM missile production, Transporter Erector Launcher (TEL) and Launch Control Center (LCC) manufacturing; (2) Clean-up all production related problems as quickly as possible; (3) Introduce into missile testing only production hardware fabricated to a firmly documented baseline; (4) Insist on setting methods for improving the quality of all subsystems and systems; and (5) Begin a concerted focus on shipboard Weapon Control System hardware and software to insure that these systems were built and installed on schedule.

These then were the concerns that I reported to you about a year ago and these were the problems that the Secretary of the Navy, the Secretary of Defense and the Congress assisted in solving by approving my restructured program. I will report to you today on the situation that now exists, but before I enter into the present status of the different variants of this weapon system, I would like to discuss the operational requirements of the Navy's cruise missiles in general.

The Navy's challenge is to deter war or if deterrence fails, respond effectively to an enemy attack. Since we have a one and a half ocean Navy with a three ocean commitment, we must find ways to maximize our capability in current ships and in those that we are building to execute a broad range of options. The Tomahawk Sea Launched Cruise Missile makes an important, cost effective contribution to this effort.

Tomahawk is not just a weapon, but a family of weapons systems consisting of several missile variants, launcher variants, and a complex mix of surface ship and submarine systems.

The three ship-launched missile variants which will be deployed with the fleet are the Tomahawk Anti-Ship Missile [TASM]; the Tomahawk conventional armed land attack missile [TLAM/C]; and the Tomahawk nuclear-armed land attack missile [TLAM/N]. TASM is currently fully operational in submarines and soon will be in surface ships. TLAM/N is scheduled for fleet introduction in June 1984. TLAM/C is still under development.

All of these variants will be deployed on a variety of Naval platforms, current and future, including attack submarines, cruisers, destroyers and battleships. They will be fired from various launch systems—from armored box launchers as on *New Jersey* today, attack submarine torpedo tubes as on current 688 class SSNs, and from vertical launchers planned for the *Spruance* and *Arleigh Burke* destroyers and follow-on 688 class submarines in the near future.

By placing this versatile family of weapons on a wide variety of surface ships and submarines, we multiply our offensive force capability. This distributes our offensive capability beyond planned carrier force levels. It complicates Soviet planning by requiring them to consider every battlegroup ship a potential threat. This substantial capability contributes to deterrence of war and enhances the Navy's ability to respond effectively at any level of conflict.

For example, the Tomahawk Anti-Ship Missile [TASM] can inflict heavy damage with its single conventional warhead. TASM extends the standoff attack capability of surface ships and submarines by a factor of 4 to 5, to an operational range of over 250 miles. Its wide area search capability enhances our ability to successfully target and attack enemy ships. With TASM we will roughly match the range of the newest Soviet anti-ship cruise missiles, such as the SS-N-12 and SS-N-19, which were introduced in 1976 and 1981 respectively.

The Tomahawk Conventional Land Attack Missile [TLAM/C] installed in an array of surface ships and submarines will provide the Navy with a new strike capability. This weapon will employ both a single conventional warhead and a multiple submunition (or bomblet) warhead. Its versatility and 400 to 700 mile range will open new options in naval warfare.

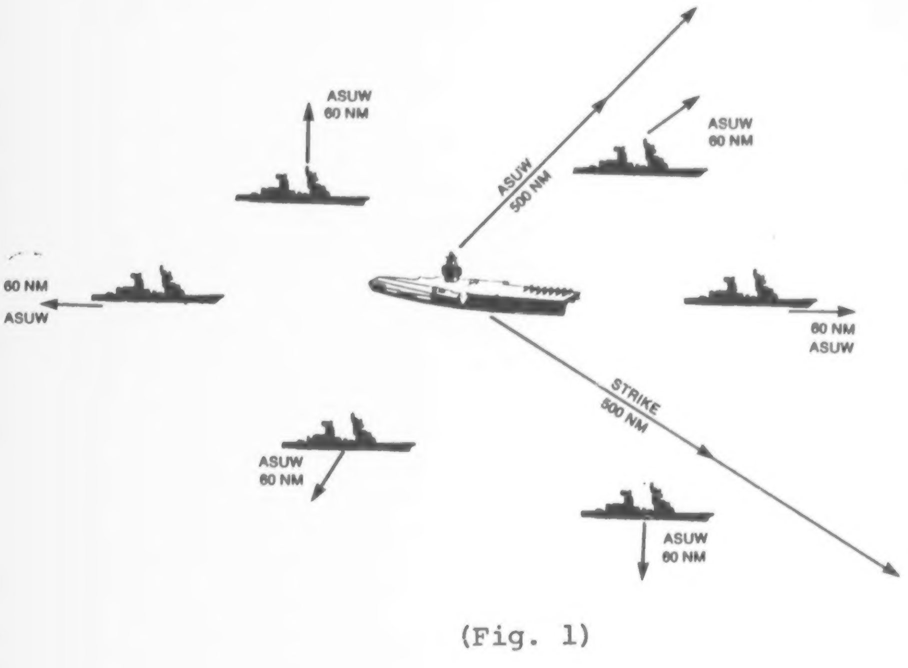
TLAM/C will both supplement and complement carrier based aircraft in situations where aircraft attrition would be unacceptably high. TLAM/C can permit a limited, measured response as an expression of U.S. will and determination without jeopardizing aircraft or pilots. It will also allow high leverage strikes against land targets from the majority of attack submarines and surface combatants. The range of options available when TLAM/C is deployed along with carrier aircraft provides a viable conventional attack option which raises the nuclear threshold.

The Tomahawk Nuclear Land Attack Cruise Missile [TLAM/N] will be introduced into the fleet this summer. It carries a nuclear warhead to an operational range in excess of 1200 miles. The Soviets SS-N-21 nuclear land attack missile is similar to

TLAM/N. TLAM/N provides the Theater Commanders with an increased worldwide capability to deter nuclear warfare and to hold at risk targets ashore should deterrence fail. The military utility of TLAM/N arises primarily from the distribution of significant offensive firepower through the deployment of TLAM/N on a large number of existing and programmed Navy submarines and surface ships. TLAM/N enhances deterrence by providing a new threat spectrum to the Soviets through a world wide strike capability, achieved with minimum risk and cost. In addition, TLAM/N supports our strategic deterrence objectives by contributing to the Nuclear Reserve Force.

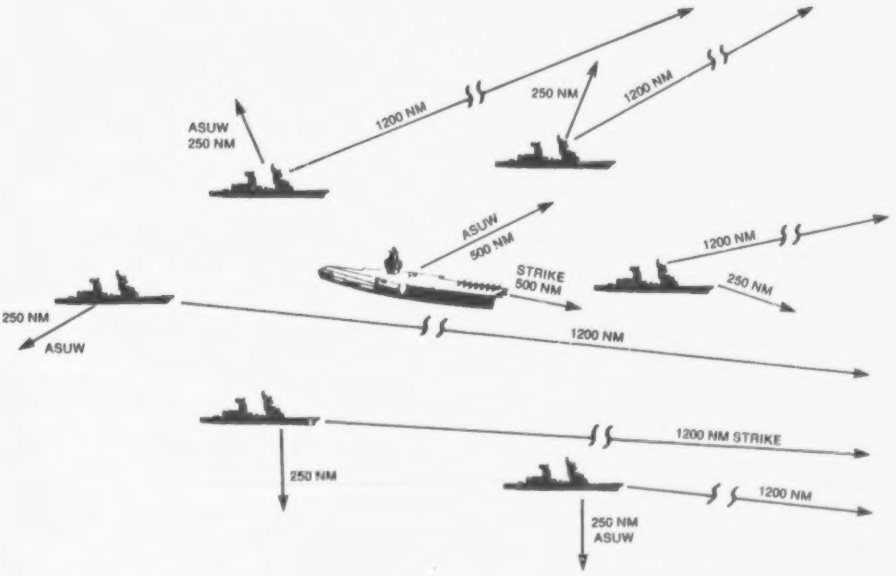
In a land attack role, the combination of carrier aircraft and TLAM/N significantly improves the carrier battle group's flexibility and effectiveness. The increased strike range of a larger number of surface ships, operating under carrier air cover as well as independent covert forward-deployed submarines, presents the Soviets a formidable threat from 360 degree axis against which they have no reliable defense. Thus, TLAM/N is ideally suited for a Nuclear Reserve Force role. When dispersed on a large number of naval platforms, it provides a significant survivable and sustainable Non-Strategic Nuclear Force for the Theater Commanders while supporting the deterrence and Nuclear Reserve Force [NRF] objectives of our national policy. It will also provide an increase in the range of escalation control options available to the National Command Authority [NCA] without resort to strategic systems. The difference in the strike capability of the carrier battle group, first without Tomahawk (Fig. 1) and then with Tomahawk (Fig. 2) is depicted in the following two charts:

CARRIER BATTLE GROUP WITHOUT TOMAHAWK



(Fig. 1)

CARRIER BATTLE GROUP WITH TOMAHAWK



(Fig. 2)

With the deployment of TLAM/N the U.S. Navy will move from a fleet centered on 14 strike platforms to a fleet with potentially over 140 strike platforms able to hold at risk large land areas not currently covered by naval forces or any other theater forces. This force will substantially enhance deterrence by denying the Soviets any calculus which could lead them to a conclusion that they could attain a favorable outcome from an initiation of hostilities with the U.S. or our Allies.

Why does the Navy need Tomahawk? It is the most cost effective way of maximizing our fleet's capabilities to deter war, or force the earliest termination on terms favorable to the United States, if deterrence fails. In essence, Tomahawk will conserve valuable resources and save lives.

As can be determined by these requirements, Tomahawk is a complex system, multiple variations to be launched from multiple platforms with multiple mission capabilities. It was this complexity that contributed to the problems previously mentioned. Under approval of Congress, I prioritized the multiple variants as part of the restructured program. The top priority was:

GROUND LAUNCHED CRUISE MISSILE

The most significant accomplishment of the program this past year was the achievement of the GLCM Initial Operational Capability [IOC] in December 1983 at Greenham Common, United Kingdom. This means that the following equipment, in addition to personnel, are capable of supporting the NATO mission: (1) four launch control centers; (2) six transporter erector launchers; (3) 20 Tomahawk missiles; (4) 11 M.A.N. tractors; and (5) all training equipment. Deployment of GLCM has both political and military impacts and is of national importance to NATO's deterrent capability and American security objectives.

Militarily, the GLCM deployment represents the first step in the modernization of America's non-strategic nuclear forces in Europe. In response to the continuing deployment of Soviet SS-20 missiles, NATO now has land based missiles capable of striking the Soviet Union. The GLCM weapon system enhances the credibility of NATO's deterrent force posture in the face of across the board improvements in Soviet nuclear forces.

The next major GLCM milestone is activation of the first flight at Comiso Air Station, Italy. Construction of base facilities is continuing and delivery of LCCs, TELs and support equipment began in late 1983. Future main operating bases (MOBs) are planned for Belgium, the Federal Republic of Germany, and the Netherlands.

SUBMARINE LAUNCHED TOMAHAWK

The Submarine Launched Tomahawk Program essentially remains on schedule and is meeting its objectives and milestones.

The Submarine variant of the Tomahawk anti-ship missile [TASM] has completed its testing and as of November 1983, has been deployed in both Atlantic and Pacific Fleet submarines. The submarine variant of the nuclear Tomahawk Land Attack Missile [TLAM/N] has also satisfactorily completed its flight and submarine compatibility testing and remains on schedule for a June 1984 fleet deployment. In support of this June deployment, the submarine TLAM/N has also completed its logistic and safety reviews by independent authorities.

The modification of submarines support facilities including submarine tenders and submarine shore facilities remains on schedule and by August 1984, we will have completed all efforts for full fleet support of both TASM and TLAM/N.

The number of Tomahawk capable submarines continues to grow and in the fall of this year we commenced, as scheduled, the upgrade of the SSN 637 class submarines to include a Tomahawk capability. By the end of fiscal year 1984, there will be 12 Tomahawk capable SSNs at sea.

SURFACE SHIP LAUNCHED TOMAHAWK

The Surface Ship Launched Tomahawk Program is also on schedule. I am sure that most of you are aware that in March 1983 we achieved an Initial Fleet Capability of Tomahawk anti-ship and conventional land attack missiles aboard the battleship *New Jersey*. This deployment was extremely significant in that soon after Tomahawk installation and testing, the battleship deployed to both the Pacific and Mediterranean areas of operation. This long deployment by the *New Jersey* will provide us with extremely valuable captive carry Tomahawk missiles and armored box launcher data in a unique operational environment. I would like to point out that this Initial Fleet Capability or IFC was achieved prior to completion of Operational Evaluation [OPEVAL]. Fleet introduction on other surface ship units of the anti-ship variant is scheduled to begin in May upon completion of OPEVAL in April. The nuclear land attack variant from surface ships is also scheduled to complete OPEVAL late this month but is not scheduled for Fleet Introduction until this summer.

As discussed previously in this statement, the deployment of the Tomahawk weapon system aboard destroyers, cruisers and battleships will provide virtually all of our naval combatants the opportunity to better realize their mission objectives—thereby distributing offensive capability for the first time beyond carrier force levels which complicates Soviet planning, provides employment flexibility and contributes to deterrence and our ability to deny the enemy military victory at any level of conflict.

TEST AND EVALUATION

We began 1983 with the Tomahawk weapon system decertified. Through a transition process that included a reordering of priorities, application of disciplines and the harnessing of the best available personnel, we were able to focus more clearly on realistic goals: (1) Produce missiles that would result in higher percentages of flight test successes—as discussed earlier in this statement we were 10 for 22 (about a 45% success rate) from July 1981 to January 1983; (2) attain and maintain the best production process possible; and (3) ensure platform workability. These goals were achieved as can be attested to by the increased success rate—from January 1983 to January 1984, 15 of 17 flight tests were successful, an increase of more than 40% from the previous time period.

As a result of these achievements, we were able both to complete OPEVAL and deploy the submarine launched TASM, as well as complete OPEVAL and ready for deployment this summer the submarine launched TLAM/N.

In the near term we will focus our attention on the upgrading of TLAM/C with a vertical dive mode of attack and to those capabilities of horizontal attack and programmable warhead detonation. We will continue our vertical launch testing for submarines and surface ships and ready the variety of platforms for Tomahawk deployment of any desired mix. Perhaps I should add at this time that in accordance with congressional guidance from the committees on appropriations, no production funds for TLAM/C will be utilized until the vertical dive concept has been demonstrated.

I would like to point out now that all Tomahawk manufacturers have made significant progress in improving their production readiness. They have all been evaluated through formal production reviews. Problems were identified; corrective actions implemented; and, readiness to build quality, reliable cruise missiles ascertained. In September 1983, the production rate of 4 to 6 a month (a quality cap directed by the Secretary of the Navy) was increased to 10 to 12 a month and this past February, the quality cap was removed to enable the Navy to continue with the scheduled low rate initial production.

The manufacturers have undergone major improvement programs within the past year. They have changed personnel at all levels, improved the flow of their production lines, revised their production processes and increased the emphasis on manufacturing related testing. In essence, the program is in production and should be able to meet all schedule and performance milestones, in the short term as well as the long.

DUAL SOURCE (FISCAL YEAR 1985)

As I have just mentioned, the Joint Cruise Missiles Project and our prime contractors have placed special emphasis on increasing the stability and quality of our cruise missile production base. During this process we have also been involved in transferring the technology between General Dynamics/Convair [GD/C] and McDonnell Douglas Astronautics Company [MDAC] to establish a production capability for Tomahawk All-Up-Rounds [AURs] at both contrators. We set out on the ambitious plan with a goal of having two contractors in a position to fully compete for the total Tomahawk fiscal year 1984 buy of 244 GLCM and SLCM All-Up-Rounds in 1983. We had made steady progress, but more time was needed to drive out technical risk to ensure production of quality, mission capable missiles from both producers.

During the past year MDAC under the Technology Transfer Program, has been authorized to build 32 Tomahawk All-Up-Rounds. The construction of a new Tomahawk Production Facility [TPF] in Titusville, Florida is complete and the first missile is scheduled for build completion by July 1984. MDAC's major subcontractor, United Space Booster, Inc, in Huntsville, Alabama has also completed their facilitization and first delivery of key sections of the missile to MDAC. GD/C and their major subcontractor, Base Ten, Inc., in Trenton, New Jersey are well on the way to fabricating and assembling the first technology transfer guidance set.

During the July through October 1983 period, the Joint Cruise Missiles Project went through a series of Dual Source Production Reviews at both GD/C MDAC and both contractors had committed resources to demonstrate their ability to produce AURs. However, there were key manufacturing processes and procedures that had not yet been demonstrated and would not be fully demonstrated prior to scheduled contract award in November. It was my assessment that the Technology Transfer Program, while essentially on schedule, was not at a point that I could technically justify awarding a fully competitive contract to either GD/C or MDAC for the production buy of All-Up-Rounds. Additional time was required to demonstrate ability to produce quality guidance sets at GD/C and quality air vehicles at MDAC to reduce technical and schedule risk.

In order to reduce the risk, maintain the stability of the existing Tomahawk production base and continue the Dual Source Program, we have fiscal year 1984 contracts for 36 All-Up-Rounds at each contractor. These limited numbers of production of rounds will facilitate transition to a full dual production award in fiscal year 1985. In my opinion, these rounds, in addition to the 32 technology transfer rounds in fiscal year 1982 and fiscal 1983 will allow sufficient technical milestones to be completed in the next 8 to 10 months. During this period we will have increased visibility into how the contractors will fabricate parts, fully assemble guidance sets and air vehicles and mechanically and electrically test their product to ensure we get a quality round. I am confident that we have implemented procedure and manufacturing network reviews, inspections, and tests that will increase our confidence in the production qualification of MDAC, GD/C and their new subcontractors and vendors. Key technical milestones will be complete before the planned competitive award of fiscal year 1985 contracts in October of this year. This simply was not the case last November.

I would like to note that earlier I mentioned that the limits that were placed on the Tomahawk missile production have been removed. Based upon problems that faced the program a year ago, Navy planning for Tomahawk buys in fiscal year

1985, fiscal year 1986 and fiscal year 1987 were reduced. As a result of the positive progress within the program, those planned reduced quantities have been subsequently increased in fiscal year 1985 and fiscal year 1986 with the support of SECNAV and DOD. These additional missiles, if authorized by Congress will certainly place us in a better competitive posture this fiscal year.

These increases, coupled with the Navy plan to buy approximately 4,000 Tomahawks (of which more than 3200 will be conventionally armed) through 1992, place the dual source program on sound ground. The Joint Cruise Missiles Project cost effectiveness model indicates that there are cost benefits to the program during procurement of Tomahawk missiles. I must also point out that the establishment of these two producers will allow us in the future to compete the significant logistics program associated with the spare parts, repair and refurbishment of the Tomahawk missile.

In summary the Joint Cruise Missiles Project remains committed to broadening the industrial base and establishing a competitive acquisition of All-Up-Rounds as soon as practical. During the past year the Project Office, GD/C and MDAC priorities have been placed on the existing manufacturing programs and this has impacted the dual source program. We are pursuing a plan to complete technology transfer and dual source production milestones so as to be in position for competitive award of the milestones in fiscal year 1985.

BUDGET AND COST

Also, since we last addressed Congress while seeking approval for the Restructured Program, a number of positive, significant changes in the overall budget picture for both the Navy's and Air Force's cruise missile have been solidified.

COST PERFORMANCE

We expected the fiscal year 1982 Airframe Contract at General Dynamics to reach its contract ceiling. The basic problem was that poor manufacturing methods and quality procedures were forcing the contractor to repeatedly subject missiles to final acceptance tests several times before they passed, thereby running up the costs. The Government's and the Contractor's efforts in completely restructuring his quality and manufacturing processes have been successful, and as a result I expect the fiscal year 1982 contract to come in close to target cost.

Although we had to delay the competitive aspects of dual source for one year, both McDonnell Douglas and General Dynamics are acting like competitors. They are concentrating their efforts into reducing manufacturing costs and still delivering a quality product. The trends we are seeing in the estimates are very encouraging and we expect the fiscal year 1985 procurement to be most competitive. The fiscal year 1985 President's budget does show, however, an increase over the fiscal year 1984 President's budget.

I will explain the differences with the following charts:

CHANGES FROM FY84 PRESIDENT's BUDGET TO FY85 PRESIDENT's BUDGET

TOTAL PROGRAM
(TY $, M)

• FY84 PRESIDENT's BUDGET	$9,415.5
— CHANGES:	
• CONVERT 36 TLAM TO TASM (CONGRESSIONAL DIRECTION)	+19.0
• AMORTIZE TOOLING & TEST (CONGRESSIONAL DIRECTION)	+59.3
• ADD 1,157 DISPENSERS	+575.4
• ADD SEIA, PSL (ENGINEERING SUPPORT)	+139.2
• REPHASE 689 MISSILES	+159.6
• NET OF OTHER CHANGES	+64.0
• FY85 PRESIDENT's BUDGET	$10,532.0
— CHANGE	+1,116.5 (+11.9%)

(Fig. 3)

SIGNIFICANT PROGRAM CHANGES FROM LAST YEAR (FY84 TO FY85 CONGRESSIONAL BUDGET)

WPN

• REPHASE 689 MISSILES PROCUREMENT QUANTITIES LOWERED BY 173 AND 248 MISSILES IN FY85 AND FY86 RESPECTIVELY AND THE BALANCE OF MISSILES AND SPARES REPHASED IN THE OUTYEARS. (RESULTS OF CPFG)	+$256.9M

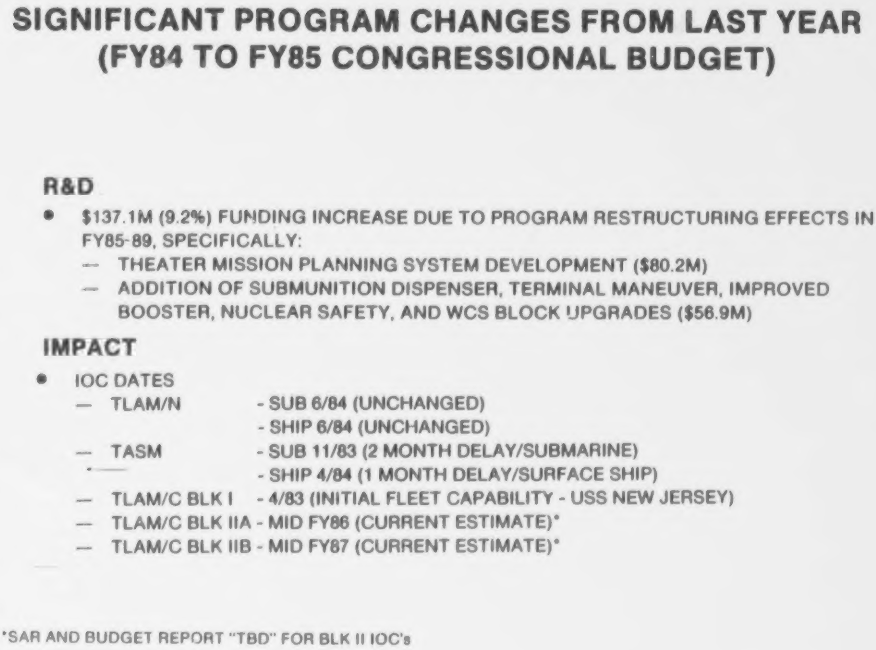
	83	84	85	86
CHANGED FROM	51	124	353	428
TO	51	124	180	180

• FY84 AUTHORIZATION ACT RESULTS:	
— 36 SURFACE SHIP TLAM/N COVERTED TO TASM	+19.0M
— FIVE YEAR TOOLING & TEST EQUIPMENT AMORTIZATION (NAVY REQUESTED FULL FUNDING IN FY84/85)	+59.3M
• INCREASE OF 1,157 SUBMUNITION DISPENSERS (BLK IIB) (FIRST INTRODUCTION OF BGM-109D VARIANT)	+575.4M
• INCORPORATE SYSTEMS ENGINEERING/INTEGRATING AGENT AND PRINCIPAL SUPPORT LAB INTO FY85 AND OUT YEARS	+139.2M
• NET OF OTHER CHANGES	+64.0M

IMPACT

• COST	
— FY84 PROCUREMENT UNIT COSTS (WPN ONLY)	FROM 3.17 TO 2.78
— TOTAL PROCUREMENT UNIT COSTS (WPN ONLY)	FROM 2.36 TO 2.64

(Fig. 4)



SIGNIFICANT PROGRAM CHANGES FROM LAST YEAR (FY84 TO FY85 CONGRESSIONAL BUDGET)

R&D

- $137.1M (9.2%) FUNDING INCREASE DUE TO PROGRAM RESTRUCTURING EFFECTS IN FY85-89, SPECIFICALLY:
  - THEATER MISSION PLANNING SYSTEM DEVELOPMENT ($80.2M)
  - ADDITION OF SUBMUNITION DISPENSER, TERMINAL MANEUVER, IMPROVED BOOSTER, NUCLEAR SAFETY, AND WCS BLOCK UPGRADES ($56.9M)

IMPACT

- IOC DATES

— TLAM/N	- SUB 6/84 (UNCHANGED)
	- SHIP 6/84 (UNCHANGED)
— TASM	- SUB 11/83 (2 MONTH DELAY/SUBMARINE)
	- SHIP 4/84 (1 MONTH DELAY/SURFACE SHIP)
— TLAM/C BLK I	- 4/83 (INITIAL FLEET CAPABILITY - USS NEW JERSEY)
— TLAM/C BLK IIA	- MID FY86 (CURRENT ESTIMATE)*
— TLAM/C BLK IIB	- MID FY87 (CURRENT ESTIMATE)*

*SAR AND BUDGET REPORT "TBD" FOR BLK II IOC's

(Fig. 5)

EXPLANATION OF CHARTS

In accordance with direction from the Armed Services Committees, we converted 36 ship-launched nuclear land attack missiles to the anti-ship conventional version at a cost of $19.0M. Also, the Congress directed both the Air Force and the Navy Cruise Missiles Programs to return to an amortization agreement with McDonnell Douglas and General Dynamics instead of fully funding tooling. This added an additional $59.3M to the WPN Budget through fiscal year 1988.

The fiscal year 1985 President's budget, for the first time, shows the BGM-109D variant (Dispenser Warhead) with a modest procurement plan from fiscal year 1986 through fiscal year 1988, then with a healthy ramp up of this version through the early fiscal year 1990's.

This dispenser version is the BLK IIB variant of the conventional land attack missile we have discussed with you over the past year. Funds from the reprogramming you approved in 1983 were used to begin the development. Our current estimate shows the addition of these dispensers will add $575.4M to the overall program.

We have also discussed with you in the past our Systems Engineering and Integration Agent (SEIA) and the Principal Support Labs (PSL). In the fiscal year 1984 budget, the costs associated with these items were included in fiscal year 1984 only—a function of timing within the budget cycle rather than unavailability of estimates. Last year many of the congressional staff members immediately focused on the need for these important functions within the program. After careful study, I have capped these items at the costs you see in the budget. The fiscal year 1985–92 costs for the SEIA and PSL are $139.2M.

During the fiscal year 1985 budget formulation cycle within the Navy, the CNO, concerned with the then status of the Cruise Missile Program, directed that fiscal year 1985 and fiscal year 1986 quantities be held to the minimum necessary to hold the two competitors' manufacturing lines open. This caused a total rephasing of 809 missiles and associated support and spares from the mid to late 1980's into the far outyears, raising the costs of these missiles (basically due to inflation projections).

In the fiscal year 1984 President's budget the fiscal year 1985 quantities were 353 for fiscal year 1985 and 428 for fiscal year 1986. Navy had planned to reduce these quantities to 120 each for both years; however, recent reviews of the program by Navy and OSD have raised confidence levels such that 60 missiles were added in both fiscal year 1985 and fiscal year 1986. In addition, the Navy is reviewing, as part of the fiscal year 1986 budget formulation cycle, the entire production output of cruise missiles with an eye to rephasing more of those missiles back to the left.

However, as the program stands today the rephasing of 689 missiles (809 minus 120) and the associated spares and support, has added an inflationary cost of $387.0M.

In fiscal year 1985 through fiscal year 1989 Navy has also added R&D funds in two areas: Mission Planning ($80.2M) and Missile Improvements ($56.9M). Both of these changes are results of the restructured program and changes in system capability deemed necessary by the Navy.

The Mission Planning funds are for the completion of a Rapid Strike Planning System, a Rapid Retargeting System, a Tomahawk Employment Command and Control/Strike Warfare System, and significant required improvements in mission production thruput, operational validation techniques, and operator performance man-machine interface—all for the purpose of increasing operational effectiveness and readiness to conduct cruise missile naval warfare.

Funds are also included for necessary missile product improvements, such as Submunition Dispenser Development (Blk IIB), Improved Booster, Nuclear Safety Systems Development, and for Block improvements to the Weapon Combat Systems for surface ships.

CONCLUSION

In concluding my formal statement to this committee today, I would like to review the conclusion of my statement to this committee just about 1 year ago.

"The testing problems which we have experienced are not insurmountable. We have tested all the variants in the operational environment and we know that they work, and work well. No other weapon in the world today can fly at the distance demonstrated by Tomahawk and strike targets with their degree of accuracy. However, we must and will achieve a higher percentage success rate. Only the highest quality missiles will be delivered to our operating forces.

"The priorities of this program have been established, the baseline defined, deficiencies identified and corrective actions taken or initiated. Upon congressional approval of the restructured program, I will be committed to meeting the IOCs of all the Tomahawk variants on time with reliable, maintainable weapon systems."

We have achieved a higher percentage of success—44 to 88 percent. We are delivering the highest quality missiles to our operating forces; and we have achieved or soon will achieve the scheduled IOC's.

Although there remains much work to be done, the progress has been rapid and we are well on our way to providing our Navy and Air Force with a significant and long awaited strike capability.

Thank you.

Senator **Warner**. Thank you. That is a good report.

Are there any disappointments whatsoever in the last 12 months?

Admiral **Hostettler**. Yes, sir; they were not all successes.

Senator **Warner**. All right, they were not all successes. How do you quantify the success and failure ratio?

Admiral **Hostettler**. From the time that I restructured the program and recertified the missiles for follow-on tests, in November of 1982, we have conducted 28 flight tests which included all variants—including the ground launched as well as the sea launched. We have had in those 28 tests, 4 reliability failures and 1 which I call a design tolerance buildup failure, which we were not aware of.

We fortunately were able to go to root cause of each of the four reliability failures, down to the individual component failure. We have corrected each of those, and the production lines now are seeing those corrections.

So, while I did not need those four reliability failures, we found out what was wrong and have corrected the deficiencies, Senator, I think that we've got a good missile from our contractor at this time.

TOMAHAWK FUNDING PROFILE

Senator **Warner**. What about your funding profile in this budget?

Admiral **Hostettler**. The funding profile in the budget has increased over 1984, for several reasons. The increase in large part is due to the restructured program that I discussed with you last year. We had in my view a lack of proper engineering support for this program. We added that engineering support to the budget.

Second, the cost of the conventional land attack Tomahawk has increased with the development and procurement of the universal dispenser.

So, that additional cost for approximately 1,700 of those what I call Block II–B Tomahawks is also in the budget. Those are the two primary budget changes.

The other is the change in the near-term rate of production, Senator. Compared to 1984, we have slipped our annual rates in the out years. As a matter of fact, a rephasing, you could say, of the program to the tune of almost 700 missiles moved out. So the inflation effect alone from that move is about $259.6 million.

You will recall that a year ago the Secretary of the Navy looked very hard at Tomahawk. We slowed down our buy in 1983 deliberately to allow us time to reset the program. We held the numbers down in 1984 until we could see what our flight test results were going to be and how we would fare in our operational evaluation.

So the 1983, 1984, 1985 numbers are significantly lower than what were planned for originally.

DUAL SOURCE PROGRAM

Senator **Warner**. What about the dual source program?

Admiral **Hostettler**. I am pleased to tell you, Senator, that we are still on track in the dual source program for a competitive buy in fiscal year 1985.

Senator **Warner**. Would you repeat that? Competitive buy in fiscal year——

Admiral **Hostettler**. In the fiscal year 1985 buy.

Last year, I indicated to you that it was my plan to make every effort to have the tech transfer between my two prime contractors far enough along that I could compete the 1984 buy. Through a set of reviews throughout the year, it was my personal view that if I were to make a decision in last October, which would have been needed to support the 1984 buy, that we were not technically ready for a full-up competition.

Each player was essentially on track relevant to the transfer, but I could not see enough of the results yet. We had not gotten far enough where I could believe that the missiles that each of those contractors would put out the door was, in fact, the one I wanted.

So I decided that we would use fiscal year 1984 not for a full competition, but for a proper transition period into the 1985 full competition buy. Accordingly, I gave each contractor 36 missiles to build from scratch. And by the time October–November rolls around of this year, I will be able to see those missiles initially qualified. Second, they will have sufficient missiles to go up on rate to attain those 1985 competitive objectives. So we should be ready in 1985 to go.

Senator **Warner**. Fine. Thank you, Admiral.

Commodore, do you have another witness?

Commodore **Bacon**. We would like to respond to your questions.

Senator **Warner**. I want you to go ahead with your presentations. I will ask questions later. I just want to be sure this record is put together in a logical manner. I have a witness list here. Apparently, it is the Navy's list. So please go ahead in any way you want to proceed. That is fine with me.

Commodore **Bacon**. Does anyone care to add anything at this time?

[No response.]

Senator, I think we are ready for questions. There are no other formal statements now.

TRIDENT I MISSILE

Senator **Warner**. Well, we want to explore the Trident I, C-4 missile program a little bit and what the problem was. Can you describe the failure mechanisms thought to be the cause of the test failures and what the corrective actions have been?

Commodore **Bacon**. Yes, sir; some of the information with regard to the technical aspects of the failures in the overall summary of the successful flight tests would really have to be handled in executive session to go into some of the details.

Senator **Warner**. We will make a note to cover that in executive session.

TACAMO PROGRAM

Now, what is the situation on the TACAMO program? We have heard several versions over here on the Senate side.

Admiral **Layman**. Yes, sir. Senator, as you are aware, I believe, and as the Secretary of the Navy has testified before several committees, in late fiscal year 1983 the Navy Department did a significant review of the need and requirements for a replacement aircraft for the current existing EC-130Q fleet and reaffirmed the need for an aircraft with range, endurance, and capability of an ECX, an E6-A aircraft.

Just recently, the Secretary of the Navy has submitted to the Secretary of Defense a request for an amended budget submission for the fiscal year 1985 budget. The Secretary of Defense has not acted on that request at this point in time, sir.

Senator **Warner**. So the status, as of this morning, is there is no request?

Admiral **Layman**. There is in the current fiscal year 1985 budget RDT&E money. There is no APN money.

STATUS OF RDT&E

Senator **Warner**. What is the status of the RDT&E? Is that on track?

Admiral **Layman**. Yes, sir; that is on track.

Senator **Warner**. Has it slipped?

Admiral **Layman**. No; the RDT&E phase is progressing well. Under the terms of the letter contract that we have with the Boeing Aerospace Corp. we do need release of fiscal year 1984 money, which is being handled through the Department of Defense.

Senator **Warner**. How many years of RDT&E had you planned?

Admiral **Layman**. Our RDT&E has a profile of over 6 years.

Senator **Warner**. Six years. Yet this is the modified 707, so it is not the aircraft?

Admiral **Layman**. It is the integration of the mission avionics.

Senator **Warner**. Yes, I would assume that.

Admiral **Layman**. And the change from the E-3 variant, to take the radar dome off the E-3, to put the necessary structure in, to fit the dual trailing wire antenna and reel, and the mission avionics equipment. That is essentially the type of RDT&E that we are doing from the E-3 variant.

Our E-6 is about 80 percent common with the E-3 aircraft.

Senator **Warner**. Eighty percent common?

Admiral **Layman**. Yes, sir.

Senator **Warner**. Well, to try to look at the profile for funding that you submitted last year in comparison to what you have this year, you had originally planned last year to have what in this fiscal year? We apparently do not have the figures with us at this moment.

Admiral **Layman**. In the APN item, we indicated that we would have on the order of $424 million.

Senator **Warner**. When?

Admiral **Layman**. In fiscal year 1985.

Senator **Warner**. And that has now been slipped?

Admiral **Layman**. Yes, sir.

Senator **Warner**. Pending review by the SecDef?

Admiral **Layman**. Yes, sir.

Senator **Warner**. Is he reviewing a $485 million number? I want to compare what he is reviewing with what you submitted last year.

Admiral **Layman**. He is reviewing a range of numbers, from $186 million to $300 million. I should point out——

Senator **Warner**. So it did not go as high as last year's submission?

Admiral **Layman**. No, sir.

But I would want to point out, Senator, that in our renegotiations with the Boeing Aerospace Corp., their part of the program, which is for the 15 aircraft, originally structured at $1.9 billion, is now at $1.59 billion, a $300 million change. An additional $100 million reduction was achieved from support costs.

Senator **Warner**. To what do you attribute that scaling down? Is that program costs?

Admiral **Layman**. That is program cost and production. That is for the total of 15 aircraft, sir.

TACAMO AIRCRAFT

Senator **Warner**. Let us go back to the origins of this issue. First, the condition of existing aircraft, the TACAMO aircraft to date.

Admiral **Layman**. I can best describe those as EC-130Q aircraft, turboprop.

Senator **Warner**. Oh, I know the aircraft well. But I am talking about what is the number of hours on them?

Admiral **Layman**. We have nine aircraft that will reach end of service life in fiscal year 1986 to 1989. Those aircraft have been through a modernization program which has given them an additional 15,000 hours.

I believe you are aware, Senator, that on October 1, 1983, we commenced on station—correction—airborne operation in the Pacific Ocean. We have been operating airborne in the Atlantic for the last decade. And so we will now be accumulating more flight hours on our fleet of aircraft.

Senator **Warner**. Now, you are stretched to the limit?

Admiral **Layman**. Yes, sir.

Senator **Warner**. As a matter of fact, we are probably going past the point of prudent management to phase that aircraft out with this slippage.

Admiral **Layman**. Looking at the program plan, sir, for the procurement aircraft, we visualize with astute management that we can maintain the flight hours until the replacement aircraft is on board.

E6-A AIRCRAFT

Senator **Warner**. This question may well be classified, but we will ask it nevertheless and you can submit your answer for the record if necessary. The new aircraft, the E6-A, will provide you with what increment of enhanced operational capability compared to your existing fleet?

Admiral **Layman**. In open session what I think I would prefer to say, Senator, is it would provide us the range and endurance that we require to be in the proper location to maintain strategic connectivity from the national command authority to the submarine force. It will have growth capability to take on new elements that we have under development, and it will have an ESM capability for warning of impending hostile attack.

Senator **Warner**. I think it would be fair to say it is a considerable enhancement?

Admiral **Layman**. Yes, sir.

Senator **Warner**. Well, the concern that the Chair expresses, and I think other members of the subcommittee, is that we are putting an enormous investment into the subsurface component of this strategic leg, and it seems to us that for a relatively small sum of money we are beginning to delay this element of the program, which takes the overall program and upgrades it considerably as an integral part of our deterrent force.

That is an opinion expressed by the Chair and I think others on the subcommittee hold that. We will now on our own initiative determine whether or not this priority, as established by the Secretary of the Navy, is a correct one.

Do you have any guidance to the committee with respect to the timing in which the Secretary of Defense is likely to make his decision as it relates to our markup session?

Admiral LAYMAN. I was advised late last week, Senator, that it was anticipated the Secretary of Defense would take action on the Secretary of the Navy's request within the next 3 to 4 days.

Senator WARNER. Then it is imminent and will not delay the action of the Senate on its authorization bill.

Admiral LAYMAN. Yes, sir.

Senator WARNER. Perhaps you could discuss each of the options presently before the Secretary and what it would add or, I should say, return to the program.

Admiral LAYMAN. What the Secretary of the Navy requested, sir, was an amended budget submission to add $187 million in fiscal year 1985 in the APN line item. This would enable us to maintain the program, recognizing the reductions we have achieved in our negotiations with the prime contractor such that we would reach an IOC in 1989.

Senator WARNER. That 1989 IOC, was that the original program IOC?

Admiral LAYMAN. Yes, sir.

Senator WARNER. So that $187 million would return this program on track as presented to the Congress last year?

Admiral LAYMAN. $187 million, sir.

Senator WARNER. What is the next increment or option?

Admiral LAYMAN. That is the only option, Senator, the only option that the Secretary of the Navy presented.

Senator WARNER. Oh, I misunderstood you.

Admiral LAYMAN. My understanding was that within various elements of the Secretary of Defense, that they were looking at different cost factors. I am not privy to any precise numbers that they are using, sir.

Senator WARNER. What would the $424 million figure have done to the program?

Admiral LAYMAN. That program would have reached an IOC within the same timeframe, with a little different building rate. That figure, sir, for fiscal year 1985 was based on the program plan under the original cost estimates of $1.9 billion. That number would have had to have been revised as we completed our contract negotiations.

Senator WARNER. So essentially, the $187 million and $424 million figures, whatever they are, are numbers which have the same impact on the program?

Admiral LAYMAN. Yes, sir, that is correct.

Senator WARNER. Now, this proposed delay by the Secretary is simply predicated on—and I respect him for this—fiscal considerations? It is not technical?

Admiral LAYMAN. No, sir; it is solely on affordability.

Senator WARNER. So they are fiscal and not technical or programmatic problems? It is purely fiscally motivated?

Admiral LAYMAN. That is correct, sir.

Senator **Warner**. And there has been no change in the requirements and so forth?

Admiral **Layman**. No, sir.

Senator **Warner**. I think the balance of our questions on the TACAMO Program will be submitted during the closed session.

ELF PROGRAM

Now, Admiral Layman, the ELF Program.

Admiral **Layman**. Yes, sir.

Senator **Warner**. Where are we now? I have struggled with that program over a decade.

Admiral **Layman**. On January——

Senator **Warner**. I do not need to go back over the whole history now. I know it very well. I know it all too well. [Laughter.]

Admiral **Layman**. As you are aware, on January 31, 1984, Judge Crabbe in the Wisconsin Federal Court handed down an injunction which had three parts: You will not do any further construction and upgrade at the Wisconsin site; you will not do any construction at the Michigan site; and you will not supply receivers to submarines.

Well, Judge Crabb, in her 67-page opinion, found that the Navy was deficient in complying fully with the National Environmental Protection Act with respect to new information that had been developed from 1977, when we filed our environmental impact statement, with respect to human health effects from ELF transmissions.

It was her judgment that we should file a supplemental EIS, and we have started that process. The Navy has filed with the judge a motion for reconsideration and, in the alternative, a stay of the injunction pending appeal.

Senator **Warner**. Now, in that motion, was there an allegation by the Navy that we had submitted adequate data on this issue?

Admiral **Layman**. Yes, sir; contained within the brief, we made the argument that our course of action that we have proceeded on was fully justified, and we also raised some significant national security concerns.

We also pointed out that the construction work that we would do would not have any additional impact, that we were merely doing the physical construction, the military construction for the antenna and the transmitter site, and that we would not in fact cause any irreparable harm, even given that the assumption was correct that there was some health effects potentially possible, because we would not be transmitting anything over and above the normal operations that we do from the Clam Lake, WI, site.

Senator **Warner**. Well, I am one who greatly respects our constitutional division of responsibilities of government and I do not mean to criticize the Federal court system, the judiciary branch of the Government. But indeed, I must express my own personal concern that the continuous delays in this program do jeopardize the United States in its capability to adequately use the present submarine force and to afford protection to those who sail on our submarines, and it concerns me greatly.

But I expect there is nothing that we can say further about this for the purpose of the hearing this morning, except that it is under review by the Federal court system now.

Admiral LAYMAN. That is correct, sir.

Senator WARNER. And the Navy is doing everything it can to expedite a resolution of the dispute?

Admiral LAYMAN. Yes, sir.

TRIDENT II

Senator WARNER. Now, Admiral Clark, on the Trident II. Can you comment on the need for Trident II procurement funds this year?

Admiral CLARK. Yes, sir. We have requested $162.9 million of WPN in fiscal year 1985 for Trident II. Of that $162.9 million, $138.5 million has been identified in our submission as being for the Trident II missile, full funding of the Trident II missile.

A preponderance of that funding is for what we call production support, which is required to establish a Trident II missile processing capability at the new strategic weapons facility that is being built at Kings Bay, GA, the Trident submarine base in Georgia that will support Trident II.

The strategic weapons system facility is in the 1985 military construction program and will start to come on line in the late 1986 and fiscal 1987 timeframe. So we have to outfit all of those buildings to enable us to process the Trident II missile at the Kings Bay facility.

Of that $138.5 million, $117.8 million is required for that purpose; $15.4 million is required for special tooling and special test equipment for the production of guidance systems at the industrial contractors.

Senator WARNER. Well, is the program on schedule, consistent with the submission last year to the Congress?

Admiral CLARK. Yes, sir; the Trident II Program that we are on right now is precisely the one that we identified to you last year at this time. We are right on our schedule.

As Commodore Bacon indicated, we completed our advanced development program as scheduled at the end of September. We had the DSARC II on the 26th of September. We were authorized to go into full-scale engineering development the first of October, and in fact we are right now signing the engineering development contracts with all of the prime and subsystem contractors.

So the program is very much on schedule and from a technical standpoint is still quite sound. The objectives that we indicated to you last year at this time are precisely the same ones that we now have.

Senator WARNER. Is there any flexibility to accelerate should that decision be made?

Admiral CLARK. Well, I think, as you are aware, we have periodically looked at that subject over the last year and a half.

Senator WARNER. Well, each year we ask you these questions.

Admiral CLARK. I think at this point there really is not any flexibility to accelerate the missile if we are to maintain the same performance objectives that we have set out for ourselves. As you know, accuracy is the principal objectives of Trident II, improved accuracy. That is, by far, the greatest technical challenge to us, and I do not believe that we could accelerate that program without seriously compromising that objective.

ELF

Senator **Warner**. Returning to the ELF, Admiral Layman, one further question. Is there any testimony that you can provide in open session with respect to other nations in the world having a system comparable to ELF?

Admiral **Layman**. I cannot respond to that question in open session, Senator.

Senator **Warner**. Thank you very much.

PENETRATION AIDS

Admiral Clark, turning to the subject of penetration aids. We have received a good deal of testimony this year with respect to the advancements made by the Soviet Union in terms of missile defense. You will recall last year the Congress appropriated some $50 million for that purpose in the Trident. What do you plan in your budget this year for penetration aids, specifically with reference to the Trident II?

Admiral **Clark**. Let me just correct one thing that you indicated. You put $5 million in the budget for Trident II.

Senator **Warner**. Oh, I see.

Admiral **Clark**. The Secretary of Defense is conducting a study at the present time, which involves both the Air Force and the Navy, to examine the question: What shall we do with regard to developing a penetration aids capability for both the ICBM's as well as the SLBM's? That study is not yet completed. Upon completion of that study, a definitive program will be defined for Trident II.

I would expect that the study will be completed probably within the next month.

Senator **Warner**. On the funding program, I am advised by staff that there were different figures in the Senate and the House and then a final compromise was reached at the conference.

Admiral **Clark**. That is correct, sir, a compromise was reached.

MILITARY CONSTRUCTION BUDGET

Senator **Warner**. In the military construction budget this year, Commodore Fox, there is a substantial sum of money for Kings Bay, GA. The amount of this request, I presume, is fully related to the Trident II IOC, but I think it would be important for the record to reflect your statements on that issue.

Commodore Fox. The budget this year supports an orderly building program to get to the 1989 IOC. The only MILCON project that will not be fully operational by 1989 will be the drydock. The drydock will be on line in 1990 to support the first scheduled Trident drydocking.

So it is a very close schedule, it is a very detailed schedule, but it is achievable.

Senator Warner. Therefore, the funding by the Congress of this line item is essential this year to keep the missile schedule?

Commodore Fox. Yes, sir; it has to be funded if we are going to make the IOC. It is all tied very closely. The missile, the ship, and the base are all linked together.

TOMAHAWK MISSILE

Senator Warner. Commodore Bacon, returning to the cruise missile, last year the committee expressed concern that the Navy had not clearly formulated its planning concept of operations for the nuclear-tipped Tomahawk missiles, aboard surface ships. What are the current plans in this regard?

Commodore Bacon. A statement was submitted by the Secretary of the Navy concerning the military utility of nuclear Tomahawk on surface ships. We can review some of those criteria.

First of all, TLAM/N ensures that the theater commander has a highly credible deterrent force. This is a survivable system dispersed on many ships, and as a nonstrategic nuclear force system is capable of holding at risk a full range of enemy military capabilities, thus forcing the outcome of any type of aggressive action by an enemy to be uncertain.

This type of system thus discourages any aggression and is really the essence of deterrence itself. That is the primary utility of nuclear weapons systems such as the nuclear Tomahawk missile—a credible deterrent force.

Senator Warner. So the operational plans for Tomahawk are consistent with our policy of deterrence on the theater nuclear force level?

Commodore Bacon. We have developed an operational concept which has been approved by the Joint Chiefs of Staff and which is consistent with our existing theater nuclear weapons philosophy and concept of operation.

Senator Warner. So there is uniformity in policy with this weapon as there is all other weapons systems? That is the point you wish to make?

Commodore Bacon. Yes, sir.

Senator Warner. Good.

NUCLEAR-TIPPED CRUISE MISSILES

Now, Commodore Bacon, proposals have been made in the Congress to ban nuclear-tipped cruise missiles. How would we verify such a ban, or is it possible to verify?

Commodore Bacon. The verification is very difficult. I would not say that it is impossible. However, banning such a system which we have developed over the past 10 years, to redress gains by the Soviets in their systems, I do not believe would be in the United States' best interest.

In our arms control initiatives, the thrust and policy has aways been at the more destabilizing systems, such as MIRVed ICBM's and verification by national technical means if possible. To go ahead and try to ban or remove nuclear sea-launched cruise missiles—I think we need to look at the more destabilizing systems first.

I would not say that verification is totally impossible. It is very difficult.

Senator **Warner**. How would you achieve that, in light of the fact of the interchangeability of the warheads with conventional?

Commodore **Bacon**. The only way to achieve that would be through an onsite inspection of the type of system, and that would include on the vessels themselves.

Senator **Warner**. When a ship embarks on a cruise, it will have to have been inspected prior to its embarkation, right?

Commodore **Bacon**. Yes, sir.

Senator **Warner**. And then if it were to receive a logistic resupply at sea, presumably it would have to be inspected again?

Commodore **Bacon**. It would be very difficult to do that.

Senator **Warner**. And likewise, at each port call?

Commodore **Bacon**. Yes, sir.

You might be able to have some type of onsite inspection so that you would have some assurance that there are just the limited numbers before they get underway, but which possibly could be cheated on when they would be at sea. That would be difficult, however.

Senator **Warner**. But you could get it through resupply at sea?

Commodore **Bacon**. Yes, sir.

Senator **Warner**. And at a port call.

[Commodore Bacon nods affirmatively.]

Senator **Warner**. Maybe there is another way. Is there another means by which to acquire the warhead once you are underway?

Commodore **Bacon**. Well, within technology's limits, I am sure there could possibly be an air deliverable system.

Senator **Warner**. An air deliverable system, dropped at sea, then. Those are the problems.

Now, gentleman, it is appropriate at this time to ask if there are any further observations that any of the witnesses desire to make in open session?

[No response.]

If not, the subcommittee will go into executive session. But first I will call upon Senator Levin.

Senator **Levin**. Mr. Chairman, I was my usual quiet self this morning. I know you did not see me come in.

Senator **Warner**. Did you say quiet elf? [Laughter.]

Senator **Levin**. I have just a few questions, Mr. Chairman, relative to the vulnerability question.

MISSILE SUBMARINES

Last year Secretary Lehman predicted that our submarines, our missile subs, would remain invulnerable for at least the next 20 years, and this is what his testimony was:

> I can tell you that there is no doubt in any of the best scientific minds that we are aware of and talked with and from our own intelligence that suggests anything moving toward the vulnerability of the sea-based leg of the strategic deterrent forces in this century. In fact, the trends are indeed that the oceans are getting more opaque, rather than more transparent.

Would you agree with that statement, Commodore?

Commodore **Bacon**. Senator Levin, I believe in and agree with that statement. I do not know how far you can project into the future. Some people would give it a decade, because it is very difficult to predict technology and modernization of new things. But I think the vulnerability of our force is such that we are essentially invulnerable now and we will stay that way essentially for a good time in the future.

But we have to continue to study that. We cannot be in a position to react to the Soviets. We must be ahead of them in that matter all of the time.

We have brought with us today Dr. Harper, the head of our SSBN security program, who will brief the subcommittee with our work in that area during the closed session, sir.

Senator **Levin**. Thank you. There are a couple of other statements that I would like you to comment on that were also given to us last year, to see if they are still true, whether you would agree with them. These next statements came from the Deputy Chief of Naval Operations for Submarine Warfare last year:

"Neither intelligence estimates nor U.S. development work in ASW indicates any dramatic advance or imminent breakthrough, either by acoustic or other means of detection."

Would you still agree that that is true?

Commodore **Bacon**. Yes, sir.

Senator **Levin**. "Nothing is known that would give credence to any assumptions that SSBN's at sea determined to avoid detection could be localized and destroyed with any confidence at all." Is that still true?

Commodore **Bacon**. Sir, that is still true.

Senator **Levin**. Would you agree that this next statement is still true:

"A broad range of recent analyses are unanimous in their views that the SSBN force is essentially invulnerable today and will remain so for the foreseeable future."

Commodore **Bacon**. Yes, sir.

Senator **Levin**. And what about Admiral Kelso's comment in March 1983, when he said that detection of floating wire antennas or communication buoys does not represent a serious threat to the U.S. SSBN force today?

Commodore **Bacon**. I do not believe they represent a serious threat. However, what we have when we look at those antennas, the floating wire antenna near the surface and the buoy, is a tether to our submarines. In the ELF system, the principal rationale is to allow our submarines to be free of the near surface operations, and also to serve as a hedge against any future ASW developments.

In addition to that, with the ability to receive that signal at depth, it allows the submarine more operational freedom, so the submarine skipper can use the environment to detect and conceal himself from any ASW threat. That helps to ensure our daily covertness while we are out there.

Senator **Levin**. I was not getting into the merits of the communications system in this question. My question, though, did relate to the issue of detection.

Admiral Kelso told us in March 1983 that detection of floating wire antennas or communications buoys does not represent a serious threat to the U.S. SSBN force today. My question was whether you still agree with that?

Commodore **Bacon**. I still agree with that today. In the future that could change.

Senator **Levin**. I was not asking you whether you have changed your mind again on ELF or anything like that.

Do we know how much money the Soviets have spent on antisubmarine warfare?

Commodore **Bacon**. No, sir, I do not.

Senator **Levin**. Do we have any way of knowing what their costs have been, say over the last 10 years?

Commodore **Bacon**. We can determine an answer for the record on that.

Senator **Levin**. That might be useful.

[The information follows:]

Soviet ASW Spending

The Intelligence Community [deleted] over the past 10 years. We do know, however, that the need to counter Western SSBNs and protect their own is the Soviet Navy's top priority and motivates a vigorous ASW program. We can see the results of that commitment. New ASW platforms with better capabilities—such as the UDALOY DDG, SIERRA SSN, and BEAR F/MOD III aircraft—enter the fleet regularly. Additionally, the Soviets maintain extensive programs in oceanographic and ASW research.

Senator **Levin**. My last question is, Are we still ahead of the Soviets in ASW?

Commodore **Bacon**. Yes, sir; we feel that we are.

Senator **Levin**. Thank you, Mr. Chairman.

Senator **Warner**. I would just like to add an observation. It is true that those statements reflect the high degree of invulnerability of this leg of the strategic triad. But I do recall—and I do not know, Dr. Harper, where you might have been—but about 1973, and we will not go into the details, it came as a real shock to the Navy when it was brought to our attention that a foreign government had ostensibly stumbled on an ASW breakthrough of considerable magnitude.

I recall the Secretary of Defense asked me and others to set up a very high-level team with unlimited funding to explore this technology, which we did over a period of some 2 years, as is my recollection. And, much to our relief, we determined that the technology was in fact not a breakthrough in ASW.

But there was a period of time of considerable concern within the Navy Department about that alleged breakthrough. All of which leads me to observe that, while we have a high degree of confidence in the invulnerability of our submarine force, nevertheless technology and the rapid means it is moving ahead worldwide could discover something tomorrow that would lessen that period or indeed lessen the invulnerability right away.

Would you care to make some general observations on this? You have devoted much of your professional career to this subject.

Dr. **Harper**. Yes, sir. At the time you discussed, I was at the Bell Telephone laboratories and was working on underwater sound detection of submarines.

I do not believe that something will come down rapidly in the period of 1 year or 2. I think we are working on time scales of concerns on the order of 10 years. But I agree with you totally that we have to look at 10, 20, and 30 years, to be concerned about an evolutionary change in ASW. I do not see something coming down as a total surprise.

And when I give you my briefing, I think you will see that we are attempting to look ahead 10 or 20 years, so that we will not get caught with our pants down by an ASW breakthrough.

Senator **Warner**. To the extent that you can in open session, let us comment on the rapid development of computerized technology and the ability to take enormous quantities of data and to make certain profiles from that data. That is an area in which many governments are now moving in ASW.

Dr. **Harper**. Yes, sir; that is an extremely important issue. For one thing, it allows you to do things from satellites that you could not think about doing before. We, of course, are concerned about satellites because of the high search rates or large areas that they can see.

Nonetheless, in most of the technologies we look at, what we find is that the signals are extremely small that we are looking at and masked by environmental noise. It takes more than computational capability. You have to have some physical insight or breakthrough, algorithm if you like, to compute, to beat down this tremendous lack of signal over noise.

So I think computation is an extremely important aspect of this problem and is one that we have to worry about. But it takes more than just computing strength. It takes a concept or a physical insight in addition, and those are the things that we also have to be concerned about.

Senator **Levin**. Mr. Chairman, if I might interject, I happen to agree with you that we want to keep our subs invulnerable and take reasonable precautions against some unforeseeable circumstances occurring which could jeopardize us.

We ought to be looking at technologies that will be relevant and survivable 10, 20, or 30 years from now. I could not agree with that more. Our subs are invulnerable. We hope they will stay invulnerable. We want to keep them invulnerable. And we should be working on technologies which are survivable, which will achieve that, as a hedge against their ever becoming vulnerable.

I really think that is the right way to go. But it is important, we feel with reasonable confidence that they are invulnerable into the nineties, as the Secretary of the Navy said, in this century. We should not act on false assumptions that they are going to become vulnerable this year, next year, or the year after in the eighties, so that we have to do things which perhaps we would not do if we were not acting with that kind of time constraint.

In terms of your general goal, I hope it is shared universally, the idea of keeping our subs invulnerable.

Senator **Warner**. I respect the viewpoint of the Senator from Michigan on this, and I think throughout the years that we have been privileged to serve together. You have been very objective on this issue and very well informed on it.

TACAMO

I have one last question. Earlier, Senator, we looked into the TACAMO Program. Admiral Layman, will you or the Secretary within the system promptly inform this committee with respect to the Secretary of Defense's decision? Do you anticipate that within the next few days it would be forthcoming?

Was there a reason for the deadline of March 31 on that?

Admiral **Layman**. There was not a deadline of the 31st. The Secretary submitted a letter. Based on the work that I have done with the OSD staff members, I was advised that they expected an answer within the next 2 or 3 days.

I certainly will advise the committee what that answer is.

Senator **Warner**. Are there any implications to the prime and subcontract structure as to the timing of this decision in terms of their own work and order requirements?

Admiral **Layman**. That is a separate issue, Senator, with respect to the release of the fiscal year 1984 money which has been handled within the Department of Defense. Without any money and without any APN money in fiscal year 1985, we would have to do, as you recognize, a restructure of the program that would have some total program impacts in a number of ways.

Senator **Warner**. What is the average life on the existing TACAMO air fleet?

Admiral **Layman**. I would like to answer that precisely for the record.

[The information follows:]

TACAMO—EC-130G/Q FORECAST TERMINATION SCHEDULE

BUNO	Fleet acceptance	SLEP	Fatigue life expended
151888 [1]	2/69	10/80	(2)
151889 [1]	2/69	1/82	(2)
151891 [1]	5/69	2/82	(2)
156170	12/67	12/81	(2)
156171	1/68	11/81	(2)
156172	4/68	1/81	(2)
156173	6/68	8/82	(2)
156174	6/68	2/82	(2)
156175	6/68	11/82	(2)
156177	6/68	4/83	(2)
159348	1/76	10/86	(2)
159469	1/76	4/86	(2)
160608	6/79	(2)	(2)
161223	12/80	(2)	(2)
161494	4/83	(2)	(2)
161495	7/83	(2)	(2)
161496	7/83	(2)	(2)
161531	11/83	(2)	(2)
162312	11/85	(2)	(2)
162313	1/86	(2)	(2)

[1] G model aircraft

[2] [Deleted.]

Admiral **Layman**. However, I believe that we have aircraft that have been operational for on the order of 18 years. We are, of course, receiving two new EC-130's within the next year.

Senator **Warner**. For this program?

Admiral **Layman**. Yes, for this program.

Senator **Warner**. I think you should provide the committee with a profile of all the TACAMO aircraft and their life expectancy and the extent to which they have been extended beyond that, even though the modernization may have contributed.

The EC-130 does not have the operational capabilities to fully service the Trident Program, does it?

Admiral **Layman**. Not in the Pacific theater.

Senator **Warner**. Thank you very much.

Are there any other questions, Senator Levin?

Senator **Levin**. No, thank you.

Senator **Warner**. Very well. We will now go into executive session and will take a 5-minute break.

[Whereupon, at 10:08 a.m., the subcommittee was recessed, to reconvene in executive session.]

EXECUTIVE SESSION

The subcommittee met, pursuant to recess, at 10:15 a.m., in room 232A, Russell Senate Office Building, Senator John Warner (chairman) presiding.

Present: Senators Thurmond, Warner, Quayle, and Exon.

Staff present: Robert F. Bott, William E. Hoehn, Jr., George K. Johnson, Jr., professional staff members; Douglas R. Graham, research assistant; and Karen A. Love, staff assistant.

Also present: Gerald J. Smith, assistant to Senator Goldwater; Bernard R. Toon, assistant to Senator Quayle; Jeffrey B. Subko, assistant to Senator Exon.

Senator **Warner**. I am informed by counsel to the committee that the room is now secure so we may proceed in executive session.

I understand that Dr. Harper will be our first witness.

Dr. Harper, when did you join the Department of the Navy?

Dr. **Harper**. About 4 years ago, sir, I came from the Bell Telephone Laboratories.

Senator **Warner**. What is your title, sir?

Dr. **Harper**. I am technical director of the SSBN Security Program.

Senator **Warner**. Thank you. Please proceed.

STATEMENT OF EDWARD Y. HARPER, TECHNICAL DIRECTOR, SSBN SECURITY PROGRAM

Dr. **Harper**. Sir, in the next 20 minutes, I will give you a few words on the methodology used in the security program and give you an example of how the program pursues a specific submarine detection technology. I am going to use [deleted] not because we are concerned about that particular technology, but because I think it serves as a generic example of how we prosecute a technology.

THE SSBN SECURITY PROGRAM

This brief is classified secret.

Agenda (20 minutes); a few words on methodology, an example of how the program pursues a specific submarine detection technology—[deleted].

A listing of current SSBN security projects, a few words and images concerning satellite detection technology, Synthetic Aperture Radar [SAR]; a few words about countermeasure developments—[deleted].

I want to give you a listing of the current SSBN security projects that we have studied. That is an extensive set of technologies, and, obviously, I do not have time to detail them all. I want to give you a few words and show you some images concerning [deleted] I am going to use the [deleted] as an example.

I want to give you a few words about countermeasure developments. In particular, I will talk about [deleted] detection of the [deleted] and the countermeasure for that, and the [deleted] and our ability to develop a countermeasure to [deleted] detection.

May I have the next slide, please?

METHODOLOGY

Goal: Avoid surprise in ASW.

Approach: Conduct research to resolve technical uncertainty in submarine detection technologies; develop countermeasure concepts before intelligence reveals a threat.

Intelligence on Soviet activity: Close coordination with intelligence community [DNI, CIA, NSA, DIA]; cannot rely on intelligence alone; Soviet research [deleted]; must look 20 to 30 years out; must consider concepts not yet discovered by Soviets.

Transend intelligence estimates by relying on laws of physics: Theoretical analyses; laboratory research; computer simulations; technology advances; at-sea experiments; operations analyses.

In terms of methodology, our goal in this program is to avoid surprise in ASW. The approach is to conduct research to resolve technical uncertainty in submarine detection technologies, and to develop countermeasure concepts before intelligence reveals a threat.

We do have intelligence on Soviet activity. In fact, we work closely in coordination with the intelligence community through the Director of Naval Intelligence, the CIA, NSA, and DIA. But we cannot rely on intelligence alone.

First of all, Soviet research is [deleted]. We must look 20 to 30 years out. We must consider concepts that perhaps the Soviets have not yet even thought of.

In order to transcend those intelligence estimates, we rely on the laws of physics, which apply to the Soviets as well as to ourselves.

Senator WARNER. Really? [General laughter.]

Dr. HARPER. Well we hope so. Otherwise we really will have a problem.

We conduct theoretical analyses, laboratory research, computer simulations, technology advances—and I will give you some examples where we really have had to push technology in order to make these assessments. We do at-sea experiments—and you will see an example—and we conduct other operational analyses to see whether these concepts make any sense from an operational point of view.

METHODOLOGY

Strong management team: Three scientists; operations analyst; four submarine officers, intelligence officer.

Contractors: Universities; Government laboratories; corporations.

Coordination: Other ASW programs; United Kingdom (restricted); operational fleet; intelligence community.

Reviews: Internal Navy; DOD; University faculty (Jason); unscheduled; Townes MX Basing Committee; Scowcroft Commission.

We have a strong management team, comprised of three scientists, all Ph.D.'s, an operations analyst, four submarine officers, and an intelligence officer. Our contractors are quite varied, and include universities, Government laboratories, and private corporations.

We have a great deal of coordination with other ASW programs, both within Navy and within DOD. We have some coordination with the United Kingdom, but it is restricted for security reasons to certain limited topics.

We coordinate with the operational fleet and with the intelligence community.

We also have a number of reviews. We have a considerable amount of internal Navy technical review. The program is reviewed by the Department of Defense. We invite certain well-known university faculty members to look at certain technical aspects of our program. One group in particular is known as the Jasons, the membership of which includes a number of Nobel Laureates, and it has reviewed our programs. We try to have those reviews every summer.

We also have what are called unscheduled reviews—for example, the Townes MX basing committee and the Scowcroft Commission had a great deal of interest in the subject of the SSBN security program.

Now, I could tell you that the way we pursue a technology is to build a detection model, to conduct experiments, and to develop the sensors required to understand and believe that model. But that really is sort of an amorphous description. So, what I will try to do with the next series of slides is to illustrate that process.

[Slide deleted.]

What you are looking at here is [deleted] a submerged submarine. This is what we call a [deleted].

Senator WARNER. What is the depth?

Dr. HARPER. I will get into that, Senator. Hopefully it will all be clear. If it is not after the next three Vu-Graphs, please ask that question again.

Senator WARNER. Did you call that a [deleted]?

Dr. HARPER. A [deleted]. I will tell you what the [deleted] is and how to understand the [deleted].

This was done in a controlled experiment on a range with an aircraft flying over an a priori known location of the submarine with [deleted]. This [indicating] is [deleted] the submarine.

You also see this track [indicating]. This track is the [deleted] from a surface vessel, which is trailing the submarine with [deleted] and I will explain why that is happening.

The point I want to make here is that this [deleted].

Senator WARNER. [Deleted.]

Dr. HARPER. Yes, sir.

May I have the next slide?

[Slide deleted.]

Now I will tell you a little bit about the [deleted] submarines.

First of all, if the submarine is on the surface, it has what we call [deleted]. This is [deleted].

When the submarine submerges, this [deleted] or very quickly disappears, and we do not worry about that as a detectable item.

There is also a [deleted], which is just the mixing of water by the hull.

Senator **Warner**. Excuse me. Would you go back to the [deleted].

Dr. **Harper**. [Deleted.]

Senator **Warner**. So, this is on the surface, [deleted].

Dr. **Harper**. That is correct, so we do not worry about [deleted] for submarines, because that disappears so fast with depth.

We do have the [deleted].

We have a miniscule displacement at the surface because, after all, the fluid is compressible and has to get out of the way for the submarine. But that miniscule displacement at the surface is completely swamped by the wave action at the surface. So, in recent years, when people have tried to do submarine detection, they have concentrated on [deleted].

One of these is called [deleted] and as the name suggests, we do create [deleted]. Those [deleted]. Another [deleted]. These [deleted]. Also, they stabilize the submarine.

If you have ever seen an aircraft land on an airport on a dusty day, [deleted].

Now, these [deleted] and the mixing of the ocean actually helps that [deleted]. If that [deleted].

Senator **Warner**. So, there is a [deleted].

Dr. **Harper**. Yes, sir.

The [deleted] is there. What has happened is the [deleted].

Senator **Warner**. Going back to call upon the ancient knowledge that I used to have many years ago, [deleted].

Dr. **Harper**. Sir, the [deleted].

Senator **Warner**. Well, there is the fact of depth.

Dr. **Harper**. Sir, it [deleted]. [Deleted] and there is not time for [deleted]. That [deleted] and then it does dissipate.

Senator **Warner**. Now, will you be going into the depth matter in a moment?

Dr. **Harper**. Yes, sir.

[Slide deleted.]

There is a theory due to a rather well-known professor [deleted]. Of course, we are concerned about this maximum height [indicating]. If that maximum height is [deleted].

That [deleted] is driven by three parameters: [deleted].

As a matter of fact, this theory was published in the open literature way back in 1972. The reason was that there was an interest and concern about [deleted].

[Slide deleted.]

Given that theory and that model, we went to sea with a submarine on a range, and we instrumented the submarine with two kinds of [deleted] with the [deleted] was able to [deleted].

Here [indicating] you can see that for a certain set of parameters that I told you were important to this problem, we have mapped out the [deleted].

The point I want to make is this. The mathematical theory said that the [deleted] and this cut [deleted] was taken at the [deleted]. The point is that there is very good agreement between measurement and theory.

The question is, do we get a detection from this?

In this case, no, because the [deleted] depth was [deleted], and, as you can see, the [deleted] is still [deleted].

However, this condition was run repeatedly, over and over again, [deleted]. When we were [deleted] shallower, [deleted] and we got [deleted] detection. When it [deleted].

Senator WARNER. What are the factors of [deleted]?

Dr. HARPER. The big factor in [deleted] is this mixing parameter, [deleted]. The more mixing you get, the higher the [deleted] rise is. This is probably as small as that parameter ever gets.

This [deleted] rise is the biggest rise we have ever been able to get [deleted].

[Deleted.] That is, [deleted]. It was the scientists who prevailed upon him to do that so that we could get the data.

But I want to say that this is atypical, not a normal operating condition.

[Slide deleted.]

I have to mention one other thing.

The essence of doing and prosecuting these sorts of questions involve, as I have said, theoretical models. We have a theoretical model, we run a test, and we need a special instrument.

You will remember that I told you we were looking at [deleted]. The usual [deleted]. So, you may have trouble seeing this.

Here is an image with a picture of that submarine on the surface, using a conventional [deleted], and I think you can see the submarine over here [indicating]. You can even make out the sail.

But you will see [deleted].

Senator WARNER. Is that on the surface?

Dr. HARPER. Yes, sir; [deleted].

Senator WARNER. I thought there was a difference between [deleted].

Dr. HARPER I'm sorry. He is on the surface. You can see the hull.

Now, we developed [deleted].

Senator WARNER. It is on the surface.

Dr. HARPER. Yes, sir.

The [deleted] we developed has [deleted]. We had to pay a price for that. We had to sacrifice [deleted]. So, again, here she is, except now she [deleted]. But we don't care. [Deleted.]

This is the same situation with a different sensor. This [deleted].

Senator WARNER. At what altitude was that taken?

Dr. HARPER. Only at about [deleted] altitude.

Senator WARNER. And the submarine is on the surface?

Dr. HARPER. Yes, sir. But in the original [deleted] submarine was submerged, at about [deleted] keel depth, [deleted] we got a detection.

Senator WARNER. If you are flying an aircraft at [deleted] and the submarine is on the surface, you don't need [deleted]. You can eyeball it.

Dr. HARPER. Yes, sir. I only showed this to illustrate the capabilities of [deleted]. I wanted to contrast the sensor we had to build for this purpose with the conventional sensor that, say, [deleted]. That was my point.

Senator **Warner**. I see.

Dr. **Harper**. May I have the next slide, please.

[Slide deleted.]

There are a lot of high order or second order of effects here. All of them have been studied and documented. Basically, we have put this issue to rest.

I want to tell you what our conclusions were: [Deleted.]

But the point is in this case, [deleted] that is, if the operator [deleted].

This information has been transmitted to the fleet, both to the force commanders and also to the submarine development squadrons that put information in tactical manuals and teaches courses in submarine operation.

So, my purpose in running through this is to illustrate how we address a particular problem.

[Slide deleted.]

This is a list of all of the technologies we currently are examining. Obviously I do not have the time to go into all of them. Let me just run through what they are.

Senator **Warner**. That's all right.

I think what you are pointing out is that you have discovered this effect. What is the date and time that we began to be concerned about this [deleted]? I don't recall too much concern in this area previously.

Dr. **Harper**. The study of [deleted] has gone on for about 15 years, and I would say there was a period in the sixties where the tests were done in a totally ad hoc fashion. There was a program called [deleted] in which there was no model. You just grabbed the best sensor you could find, flew out over a submarine, sometimes you saw [deleted] and sometimes you didn't.

Then, in the early seventies, or the mid-seventies, by this time the program was a strategic systems funded program, and what I would call a rational approach to this problem was developed. This is, we began to develop a model for what was causing the signature. We identified the [deleted]. We ran at-sea tests with instruments developed specifically to make the measurement.

So, we have a validated model and we understand the mechanism. We understand how to control it.

I would say that this is the way we now like to approach all of these problems, rather than running a lot of tests without knowing what it is about.

Senator **Warner**. Well, to the operators, now, you have compiled this information and we will have to continue to monitor [deleted] through the years. Does it appear to be any serious threat to the ASW breakthrough?

Dr. **Harper**. No, sir.

Senator **Warner**. Modifications in your operating procedures can minimize this type of detection?

Commodore **Bacon**. That is correct.

Senator **Warner**. We are not going to mount a program to see if we can get a better [deleted]?

Dr. **Harper**. No, sir. As a matter of fact, we have closed the books on this.

But the point I would like to try to make is that a more sensitive sensor is not going to change this situation. If you don't [deleted] you simply don't have the signal.

Commodore Fox. Senator, if you operate within the envelope in our tactical procedures manuals, you will eliminate that as a detection possibility.

Senator **Warner**. That is a good point.

Dr. **Harper**. Again, I did not address infrared to tell you that we had a specific problem here. In fact, we do not. I used it just for illustrative purposes, as to how we approach a detection problem.

Senator **Warner**. I would hope we would continue to keep a watchful eye on this subject through the years.

Dr. **Harper**. Yes, sir.

[Slide deleted.]

Here is a list of subjects that we are currently looking at.

We are looking at [deleted] that is, can you use [deleted] systems that could look [deleted] under water. We are running tests currently in that area in case that sort of technology proves to be a problem. We are looking at techniques for [deleted] such systems, and that borrows on [deleted] technology that have been used in [deleted]. We are looking at [deleted], that is, the placement of [deleted]. We are looking at [deleted]. We are looking at [deleted]. We are actually [deleted] .

Also, we are looking at [deleted]. We spend a lot of time looking at [deleted].

Senator **Warner**. What is [deleted]?

Dr. **Harper**. It is used by the [deleted]. There are [deleted] that are used. In fact, there are [deleted].

Also, there have been some real breakthroughs in [deleted].

We spend a considerable amount of time trying to understand [deleted] so that we can construct models of signature detection. We are concerned about [deleted] and if the Soviets with vessels equipped with [deleted] in port, at least, they have the datum. They don't have the search problems. But could they [deleted]?

We are looking at [deleted]. The ocean, as you know, is a conducting fluid. The [deleted], and can those be conducted?

We have a significant environmental program to understand the oceans and all of the variability in the oceans. We need to know about the ocean because it provides the noise against which we have to detect.

There is a very big tactical aspect to this program.

We do a number of studies on [deleted]. We actually look at scenarios; could the Soviets [deleted].

We spend considerable effort looking at Trident detectibility. We run security exercises [deleted] against a Trident submarine as she [deleted].

We have certain [deleted] tactics that we use—we develop techniques for [deleted], and those exercises are run.

We have countermeasures whose effectiveness we test in exercises; for example, if a submarine has [deleted], that effectivness information is acquired. Using the variability of the ocean [deleted] is studied with a view toward avoiding detection. We call this tactical oceanography.

Senator **WARNER**. This has to be the most fascinating subject.

Dr. **HARPER**. Sir, it really is.

Senator **WARNER**. It must be a privilege to have your job.

Dr. **HARPER**. It is.

As a matter of fact, I came from Bell Labs on a 2-year leave of absence, and that was 4 years ago. I could not bring myself to go back.

Senator **WARNER**. Of course, in the meantime, we have busted up most of your system. [General laughter.]

There is, of course, infinite wisdom in the decision of politicians.

Dr. **HARPER**. Yes, sir.

I will switch to [deleted] now, and I want to talk about [deleted].

Senator **WARNER**. The staff has handed me an interesting question.

How has Trident performed in ASW exercises with our own SSN's? That, really, is an operational question.

Why don't we record that question now for the appropriate time later. But I thought it related to this.

Dr. **HARPER**. It does, and as a matter of fact, we can answer it.

Senator **WARNER**. You can shelve the question, but at the appropriate point in your briefing, do address it.

Dr. **HARPER**. Let me just say something and later Commodore Bacon can address it, if you wish.

In one of the tactical exercises that we support, an SSN, [deleted] until it was [deleted] on the other hand, [deleted].

These are [deleted] that you would never expect to have.

Would you like to add to that?

Commodore **BACON**. I can add to that.

As you know, [deleted].

Prior to 1983, we have done [deleted]. In 1983, we did [deleted]. We try to do [deleted].

In November 1982, we did one on [deleted] knew exactly where [deleted]. Initial detection on [deleted], classified as [deleted] with a range of [deleted]. The [deleted]. The *Ohio* class is very quiet, among the quietest in the world.

[Slide deleted.]

Senator **WARNER**. That is a good report.

Dr. **HARPER**. I will turn now to the question of satellite detection. I am going to use, as an example, synthetic aperture radar.

There was a satellite put up by NASA in 1979 called SEASAT. That satellite had a synthetic aperture radar, or SAR on it. That SAR was very capable. Synthetic aperture radars are capable of getting very high spatial resolution.

This is an example of a SEASAT SAR image of a town in Holland, a port town.

As you can see, here are the streets and houses. They are very clear.

This is a satellite SAR image. It looks like an aerial photograph, but, in fact, was taken from a satellite. This is meant to illustrate the capability of SAR's.

[Slide deleted.]

Now, when you look at the open ocean with a SEASAT SAR, you see not only surface ships, which are these [indicating] bright dots, but you see [deleted].

Senator WARNER. Did you mean surface ships?

Dr. HARPER. I'm sorry.

These [indicating] are surface ships. What you see [deleted].

These pictures are typically about 60 kilometers by 40 kilometers, or 30 miles by 20 miles.

Senator WARNER. So, there is a persistence there.

Dr. HARPER. [Deleted.] That engendered a great deal of concern on the part of some people. In fact, we look at this issue very carefully because some people speculated that [deleted].

We have studied that issue very carefully using some of the best scientists from universities and private corporations in the country. In fact, the Jason group that I mentioned to you earlier has reviewed this issue on at least two occasions.

Our assessments are that the synthetic aperture radars cannot detect, [deleted] submarines.

Just to be sure, we processed all of the confluences of the 1978 SEASAT overflights over our SSBN's on patrol. I am going to show you two of those images. There were four cases.

[Slide deleted.]

Before I do, this image is a SEASAT image, which does not contain a submarine target. I just want to show you what the open ocean looks like using the SAR.

There are no surface ships and to our knowlege no submarines there. This is about 40 kilometers by 30 kilometers. I simply want to point out the variability that one sees.

Senator WARNER. At what altitude?

Dr. HARPER. This was at 8 kilometers.

[Pause.]

I'm sorry, it was 800 kilometers.

Senator WARNER. Well, at any rate, it is up there.

Dr. HARPER. It was 400 miles, about 800 kilometers.

[Slide deleted.]

Now, within the boundaries of the net scene, there is a strategic submarine on patrol, and I would just ask you to look at the scene first to see if you think you see anything that looks like a [deleted].

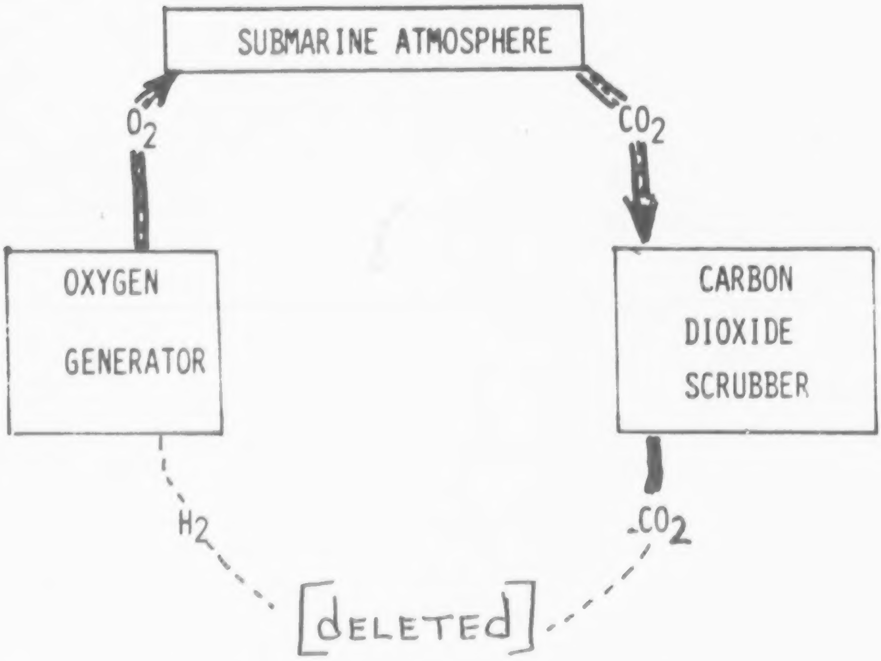
Now, I will put the overlay on this, I will show you that the submarine is located here [indicating]. He is going 5½ knots. He is at 58 feet keel depth which is quite shallow, and there is no sign of [deleted]. If you saw [deleted] because the submarine is heading that way [indicating].

[Slide deleted.]

In the next case, again, there is an SSBN on patrol, in this case within the boundaries here [indicating]. If you put on the overlay, the submarine is located here [indicating] and is moving in this direction [indicating]. As you can see, there is no sign of [deleted].

This is the case for all four cases in which there are confluences of SEASAT images and our SSBN's. This is totally consistent with our theoretical models of detectability.

May I have the next slide, please.



I want to address some countermeasure issues now.

The life support system on a submarine, which obviously requires oxygen, has the oxygen provided by an oxygen generator, which separates water into hydrogen and oxygen. Oxygen is provided to the crew, and the hydrogen is pumped overboard as a gas. In addition, carbon dioxide has to be removed. That carbon dioxide is removed through a scrubber, and the CO_2 is also put overboard.

[Deleted.]

Senator **Warner**. Is it an intermittent discharge, gentlemen? I cannot remember.

Commodore **Fox**. It is fairly steady, sir, as long as the oxygen generator and the carbon dioxide scrubber operate.

Senator **Warner**. And that is within some measure of control by the operator?

Commodore **Fox**. Certainly, to maintain the atmosphere within limits.

Dr. **Harper**. Now, the concern is [deleted].

This created concern that if this capability were combined with [deleted].

We devised a countermeasure, that is, [deleted].

Senator **Warner**. Did this require a retrofit to our boats?

Commodore **Fox**. Yes, sir.

Senator **Warner**. Where are we in that program?

Commodore **Fox**. It is [deleted].

Dr. **Harper**. [Deleted.]

Senator **Warner**. Just out of curiosity, at what level of the Navy is that program known?

For example, do your skippers know about it?

Commodore Fox. I am sure they do. I am being speculative, but I am sure they do.

We have an SSBN security program working group in which the type commanders meet and discuss the problems and the solutions with them.

We have the [deleted] being fine tuned [deleted], et cetera.

Senator **Warner**. So your type commanders are briefed on this?

Commodore Fox. Yes, sir.

Senator **Warner**. Well, I suppose there must be some dispersal of this knowledge.

Commodore Fox. But our story, sir, [deleted].

[Slide deleted.]

Dr. **Harper**. We have developed a countermeasure to [deleted]. This is one that I like very much because it is generic. In a sense, it is a general counter-measure, independent of whatever threat sensor [deleted]. It came from a technology base from the DARPA program and utilizes what we call [deleted] developed for the SSBN's.

Basically, what we can do with that long array is detect the sound from the aircraft which is radiated into the water.

In the security program, we have developed an [deleted] which goes off and for which we have designed algorithms to detect [deleted]. All of our estimates and experiments indicate that we can detect [deleted]. The difference is due to the difference [deleted].

All of our encounter studies indicate that, given [deleted], we would have sufficient time to avoid all [deleted], at least, all that we have been able to conceive of. It does require, however, that we have [deleted].

[Slide deleted.]

We have a countermeasure to [deleted]. The signal and noise decrease at the same rates, [deleted]. Therefore, the signal to noise ratio remains constant, [deleted]. We can reduce the receiver noise level, and so, [deleted].

We have conducted at-sea tests which have demonstrated the ability of the operator to maintain this [deleted]. If we were ever faced with [deleted], we could employ that technique if we saw the threat.

[Slide deleted.]

I have added this last Vu-Graph because the subject of ELF came up. My technical view is limited to a concern about detecting submarines. I recognize that ELF involves other issues [deleted].

This is a somewhat narrower view.

I want to point out that the detection of [deleted] is not the problem. As Commodore Bacon said, the problem with the [deleted].

My concern frankly is detection by some future [deleted] system of either the [deleted].

We do have communication buoys. First of all, the detection of a buoy itself is a factor. A buoy is quite shallow, [deleted]. The buoy is very small and [deleted]. But, nonetheless, it is an area of concern.

Furthermore, the patrol speed one uses limits [deleted]. So, it is true that at [deleted] knots we can patrol at [deleted]; but, and

Commodore Bacon alluded to this, if you want to go to [deleted] knots, you have to come to [deleted] and if you want to go to [deleted] knots, you have to come up to [deleted].

So, we are still on the buoy, inhibited [deleted].

Senator **Warner**. Why is that? Just for my own curiosity, why is that an operational requirement, that [deleted]?

Commodore **Bacon**. At the higher speed you would not be able [deleted]. It is automatically trying to [deleted].

Dr. **Harper**. It is simply mechanical, sir. You simply cannot [deleted].

So, in my opinion, ELF is insurance against a breakthrough in [deleted]. We could, using ELF, patrol at [deleted].

From my point of view, as one who worries about these future detection systems, I think that is an extremely important insurance policy.

Furthermore, there is another important aspect. Once you have an ELF system, you could deploy the buoy [deleted] to receive high data rate messages. So, [deleted].

That concludes my briefing, Mr. Chairman.

Senator **Warner**. That was a very fine briefing. Thank you, sir.

All right, gentlemen, what else do we have here by way of classified data?

Commodore **Fox**. Senator, I would like to summarize, as an operator, what Dr. Harper talked about.

[Deleted.] ELF provides that capability.

That is why it is important to operations.

Senator **Warner**. All right.

Thank you.

C-4 MISSILE

Commodore **Bacon**. Mr. Chairman, we will discuss the C-4 missile test failures that you had asked about in open session.

Admiral Clark, would you like to discuss that?

Admiral **Clark**. Before discussing this in detail, let me preface my remarks by indicating that the demonstrated in-flight reliability based on all of our submarine launchings of tactical missiles is presently at [deleted] percent.

[Deleted.] The goal was [deleted] percent and we now stand at [deleted] percent.

Senator **Warner**. Where are we on the development cycle?

Admiral **Clark**. Well, the missile has been deployed for over 4 years now.

Senator **Warner**. Are we running a concurrency here?

Admiral **Clark**. We are completely out of development.

Senator **Warner**. These are just intermittent testings of an operational system, then?

Commodore **Bacon**. We have two basic kinds of tests that we run when a system becomes operational. One is the Demonstration and Shakedown Operation [DASO] flight test, one per submarine, now; and the operational test series. The operational test series is really kind of a random test that is run on the population of missiles and submarines that are deployed. Missiles are chosen at random, as well as submarines at random, and we fire anywhere from two to four missiles per exercise.

So, at this point, we are doing a lot more operational testing than we are of DASO missiles.

So, while we are very close to our goal, essentially are at our goal, I still have some concern relative to the first stage motor. It accounts for the majority of the unreliability that has been observed in flight test; and while we understand the nature of the failure modes and have been able to take what I think are effective corrective actions in the production of new motors [deleted].

That leaves us with about 50 percent of the population over which I still have some concern.

I would like to elaborate just a little bit.

Would you put this up on the screen, please?

[Slide deleted.]

What I have listed here are all of the first stage motor failures that have occurred in all of our submarined launches. We fired 66 missiles from submarines. The first series was referred to as the PEM series. These were seven missiles that were the last part of the development program. These were production prototype missiles. All the missiles after that, the DASO's and the OT's, were the tactical missiles.

We have had basically [deleted] in all of these 66 shots. The first one occurred on the very first missile that we fired from the submarine, the first R&D missile fired from the submarine. In that case, it [deleted] right after ignition of the motor, very early in the first stage of flight.

After a rather extensive investigation, we determined that the most likely [deleted] was a chamber defect or damage to that chamber after it was delivered to the Government.

We took corrective action in the handling and the processing of motors after they were delivered to the Government, as well as during the processing of chambers in the production facility. We have not had a recurrence [deleted] since then.

[Deleted.]

Senator **Warner**. I have two questions.

Again, [deleted] percent of your tests have been successful.

Admiral **Clark**. Actually it was [deleted] percent.

Senator **Warner**. Where are you in your acquisition cycle of C-4, percentagewise?

Admiral **Clark**. We are in the last buy.

These corrective actions have been cut into production and we will end up catching about half of the population.

So, we have approximately half the population, the early half, which may require some corrective action, but we are not certain yet.

Senator **Warner**. What is the total C-4 buy?

Admiral **Clark**. Well, the buy is projected at 570 missiles.

Senator **Warner**. We are now at what?

Admiral **Clark**. I don't have the exact number that has been delivered. I can get that for you.

Senator **Warner**. Give me a ballpark figure and we can put the actual figure in the record.

Admiral **Clark**. I think we have delivered somewhere on the order of about 400 missiles. But the corrective actions were actually cut in some time ago. So, when you look at the missiles that already have been expended and take those into account, we will again end up with about 50 percent in each area.

[The information follows:]

As of 13 March 1984, 398 Trident I missiles were delivered.

Senator **Warner**. Is there complete concurrence as to how to attack this problem between the Navy and the contractor, or do you have divergent views?

Admiral **Clark**. No; we have complete agreement as to how to go about at least investigating the problem. Lockheed Missiles and Space Co. [LMSC], is the missile contractor; the propulsion contractor is a subcontractor of Lockheed—it is a joint venture with Hercules and Thiokol.

Senator **Warner**. Well, then, they are old pros.

Admiral **Clark**. We do agree certainly on the one, and there seems to be only one, technical approach to correcting the problem.

There is one other area of concern that I might mention. Naturally, the one that comes to mind is what is the impact of this on Trident II.

Certainly there are lessons to be learned in all of this, some of which we already have learned with regard to the Trident II motors. We still have time, I think quite a bit of time, as a matter of fact, in Trident II to put into that program the corrective actions and the things that we learn from future investigations on this particular problem.

Senator **Warner**. I certainly hope we would incorporate in Trident II the learning curve out of this. Is that not correct, Commodore Fox?

Commodore **Fox**. Yes, sir.

Senator **Warner**. Gentleman, what is left today? I am in no hurry, but I do want to move along.

What do we have remaining?

[Pause.]

We have a fine new counsel here and I will examine his performance now.

Why don't you go ahead and ask the question, Bob, since we are in executive session.

NUCLEAR TIPPED CRUISE MISSILES

Mr. **Bott**. Commodore Bacon, this question is for you. Does the deployment of nuclear tipped cruise missiles on surface ships detract in any way from the conventional missions of those ships?

Also, does it jeopardize in any way the funding or support priorities that will be given to conventional missions?

Commodore **Bacon**. The deployment of the nuclear Tomahawk missile on surface ships or submarines should not change their general purpose operations at all. They will be part of battle groups or surface action groups or deployed in normal training in peacetime. They will have Tomahawks deployed on them as we build up to 758 TLAM/N by 1992.

However, I do not foresee that their general objectives will change because of the deployment of that particular weapon system on the ship. They will be involved in the same types of taskings and missions that they now have, but they would have the additional capability with the Tomahawks on board.

Senator WARNER. Well, as a point of example, let's take a Tomahawk and go aboard the Aegis. All right?

Commodore BACON. Yes, sir.

Senator WARNER. What class of ships would it go aboard?

Admiral HOSTETTLER. Approximately 190 ships and submarines are presently planned to be Tomahawk capable. The 963s will carry, in some cases, the armored box launchers, while others will be installed with vertical launchers.

The CGNs 36, 37, 38, 39, 40 and 41 as well as U.S.S. *Long Beach* (CGN-9) will be installed with armored box launchers.

The CG-47 class, coming off the line beginning in fiscal year 1986 will go to vertical launch. Of course the battleships will be installed with eight armored box launchers. Finally, the DDG-51 new construction class will also be installed with the vertical launcher.

Now, for submarines, you have both the 637 class, which is torpedo tube launched only, and the 688 class, which is currently torpedo tube launched also. This class, however, will be installed with a vertical launch system beginning with the SSN-719.

Senator WARNER. Is that retrofit or new construction?

Admiral HOSTETTLER. That is new contruction on those 688's.

Senator WARNER. No retrofit, then?

Admiral HOSTETTLER. There is none planned to my knowledge.

Senator WARNER. Now, in your current inventory of nukes you have SUBROC. What else are you carrying operationally on your surface ships?

Admiral HOSTETTLER. On the surface ships we have Harpoon, but in separate launchers. The armored box launchers only carry Tomahawks of any desired nuclear land attack, conventional land attack or anti-ship.

In the case of the vertical launch system from the surface ships, you can get the Tomahawk in any one of the three variants. You also have the ASROC variant, that will be vertically launched upon completion of its development, and, of course, the standard missile, the AAW weapon.

Senator WARNER. I think this dovetails with the question of whether or not there is any change in the Tomahawk. I would not think so.

Admiral HOSTETTLER. No, sir.

The same concept of operation for the tactical weapon applies in the regular tactical organization, as Commodore Bacon said.

SEA LAUNCHED CRUISE MISSILE

Mr. BOTT. Commodore Bacon, I have one more question.

Again, with regard to SLCM, can you comment for the record on the unique contributions that the nuclear tipped SLCM make to the deterrence of conflict, either nuclear or conventional?

Commodore **Bacon**. Well, I mentioned in open testimony my views on the deterrent aspect of the nuclear version of Tomahawk, that it creates a sense of doubt in the Soviet planner that he would not be able to respond to the type of theater force that TLAM/N gives us.

Now, in the military utility aspects of this weapons system, we talk about a credible deterrent force, but in the full range of the program, as Admiral Hostettler said, with 148 ships in 1992, with 758 TLAM/N's and 2,956 Tomahawks of all variants that we plan on these ships, we have increased the Navy's offensive striking firepower with significantly more range capability, a tremendous increase.

We can range over [deleted] with this system. An accuracy of about [deleted] circular error probable and a yield of [deleted] gives us a hard target kill capability. With an increased range about double that of our manned aircraft systems, we have really given the Navy a very high offensive striking capability against land targets.

Now that range in itself gives the theater commander the ability to strike from a position of much lower risk. I can put a carrier battle group or surface action group [deleted] and still range [deleted]. I can range [deleted] with this weapon system with our surface ships with TLAM/N employed on them [deleted].

In addition, with the range and the hard target capability of this system, [deleted].

The system complements our carrier battle groups. It adds to their firepower, so that the Soviets cannot concentrate on just the carrier battle group, or the carrier itself with one or two platforms. It must concentrate on a number of surface ships in a formation or on our task forces at sea.

Overall, with the number of systems which we plan, the survivability and sustainability of this offensive firepower, I think, is a significant factor in the military utility of the TLAM/N to our Navy. The survivability itself gives us the ability to have a reserve role for TLAM/N, [deleted]. It gives them a wider range of options with a systm that is slow flying, a not particularly destabilizing type of nuclear weapon system, and it has [deleted]. It is a [deleted] response which the National Command authority could use.

Those are the types of things I think sum up some of the military utility of the Tomahawk nuclear weapon system to our Navy.

Senator **Warner**. Admiral Layman, would you care to comment now on other nations and their ability to communicate with submarines in a matter comparable to ELF?

Admiral **Layman**. Yes, sir.

We have recent evidence that there is [deleted] going on by the [deleted] comparable system, operating virtually at the [deleted] at which our system operated, located [deleted].

It appears that that system is in a [deleted] phase at this point.

I would also want to point out that, on the friendly side, both the [deleted] and the [deleted] have expressed an interest and have had an exchange of technical information. Both of those countries have rock formations which would support an ELF-like system for their deterrent forces.

Senator **Warner**. Senator Quayle, we welcome your participation this morning. Do you have any questions for our panel? We are in executive session, but we would be happy to have your responses either in open or executive session, according to your wish.

Senator **Quayle**. Well, since we are in executive session, why don't we just stay there. I do have a couple of general questions that may or may not have been covered.

CONVENTIONAL SLCM

Could you give me the status of what we are doing, and my interest focuses on the conventional sea launched cruise missile, its range, and what kind of efforts we are, in fact, making of that in our war fighting plans. It is my understanding that the conventional range of the sea launched cruise missile is much less, about half, of the nuclear sea launched cruise missile.

Is that correct?

Commodore **Bacon**. Yes, the approximate range is about half.

Senator **Warner**. Are they two different missiles, altogether different, with different propellants, et cetera?

May I ask that question?

Senator **Quayle**. Certainly, and maybe they could describe the missiles for us.

Mr. Chairman, the gist of my question is that we probably ought to look more toward enhancing our conventional capabilities with the sea launched cruise missiles, particularly for their accuracy and the deterrence of nuclear war. But if you get down to the ranges, you are going to find that the nuclear missile has twice the range as the conventional missile.

My question is what are we doing about that and don't you think it might be better if we had the roles actually reversed?

That is where I am coming from. Maybe you could describe the two missiles to us and tell us why—I think it is because of the payload which affects the range—why we can't move to switch that around. I think in war fighting capabilities, we really ought to go a little bit more for conventional. That is my question and my concern.

Admiral **Hostettler**. First of all, Tomahawk, as you know, Senator, is a family of missiles, and there is a tremendous amount of commonality designed into this family.

The aft two-thirds of the missile, from the warhead section back is common across the board on all Tomahawk variants, ground and sea launched.

[Slide deleted.]

This slide explains a little bit why the delta is in the range.

For instance, from the wings back the missile is the same. This one shows the antiship launched missile. It has the bullpup warhead.

The seeker on the anti-ship version is an active seeker, a radar seeker, so you can home in, guiding it on a ship's structure, and then hit that structure. The warhead on that variant is the same as it is in the conventional land attack variant.

The guidance in the conventional land attack is the same as the guidance in the nuclear land attack, except we add an additional section called a digital scene matching area correlator. We add this system in order to get the kind of accuracies needed for the conventional land attack.

The point is, there is a great deal of commonality.

The warhead sections are almost interchangeable.

The range of the nuclear land attack is by far the longest because it is the lightest. It takes less volume for the warhead.

Consequently, around the nuclear warhead I've got a fuel tank because the warhead is small enough, given only [deleted] and I could add more fuel in here [indicating]; the guidance set is almost the same as the one in the conventional, except I do have to add that digital scene matching area correlator, and by the way an illuminator, to see the target at night. So, the difference in range is about half, because of the extra fuel in the nuclear version.

The operational range of the nuclear missile is about 1,350 nautical miles.

Now, we know, based on our recent test data, that 1,350 miles is [deleted]. It looks like it is going to be [deleted]. We have not published that yet. We are doing pretty well with range. The range of the conventional fully fueled missile that we launch from surface ships is about [deleted] nautical miles. That can be pushed to [deleted].

So, Senator, you are pretty correct in your statement about half.

The difference is in the warhead payload. To get 1,000 pounds out there, to do the damage we want, it was a tradeoff of range versus warhead payload. If I want to fire a small 500-pound bomb out there, you can bet I can get those ranges. But you are not going to get the same warhead effectiveness.

Now, [deleted] miles is pretty good if you look at your arcs of fire, particularly from a submarine launch. It get us in that [deleted] range that Commodore Bacon was talking about.

In the near term not much can be done. When you talk about future technology—new fuels—we can talk to efficiencies on new baselines. That is not going to happen in the next 3 or 4 years, in my view.

Senator QUAYLE. What is the breakdown of the nuclear tip versus the conventional tip on the Tomahawk sea-launched cruise missile for land attack?

Admiral HOSTETTLER. The total number right now?

Senator QUAYLE. Yes. I was under the impression that most of this was going to be conventional.

Commodore BACON. It is 758 for the nuclear tipped and the remainder are the TASM's and TLAM/C's up to 2,956 by 1992.

Senator QUAYLE. What is the TASM?

Commodore BACON. The antiship missile.

Senator QUAYLE. The antiship missile, can that also be land attack?

Commodore BACON. No.

Senator QUAYLE. It cannot be?

Admiral HOSTETTLER. If I could cover that one, Senator, there are sort of three different versions: two basic ones, a land attack and an antiship version. Those are somewhat different because the front end, or guidance, has a different problem to solve. One is an active radar seeker, in the case of the antiship, where we go out to an approximate target position, given by [deleted] about 300 miles away from the launchpoint. We go out to an area, search it, find the target, home in and hit it.

It is a different guidance. That is called the Tomahawk antiship missile or TASM.

Senator QUAYLE. The Tomahawk antiship missile?

Admiral HOSTETTLER. That's it.

The total program buy planned for TASM is [deleted] for both submarines and surface ships. As Commodore Bacon says, [deleted] was the nuclear land attack (TLAM/N) ship launched and submarine launched total. [Deleted] is the TASM total that breaks pretty close to 50/50 ship/submarine; and finally, the conventional land attack.

Senator QUAYLE. That's what I thought.

Admiral HOSTETTLER. That should add up to [deleted] which has been our program objective for production missiles.

Senator QUAYLE. Now, on the conventional, will you break that down into antiship and land attack?

Admiral HOSTETTLER. The antiship are all conventional. There is no nuclear version in the TASM or antiship plan.

Senator QUAYLE. So, is that [deleted].

Admiral HOSTETTLER. It is all conventional.

Senator QUAYLE. Is it included in the [deleted].

Admiral HOSTETTLER. No.

Senator QUAYLE. Is it an add-on?

Admiral HOSTETTLER. It is [deleted] nuclear plus——

Senator QUAYLE. Yes, the nuclear land attack is 758, but what about the conventional land attack?

Admiral HOSTETTLER. [Deleted.] The conventional land attack also has two versions in the future. Today the conventional land attack has the Bullpup, 1,000 pound warhead that I showed you which, by the way, is the same warhead as in the antiship version.

We now have under development a new warhead for that conventional missile. It is called a universal dispenser. It can dispense a series, [deleted], up to [deleted] various munitions. Our baseline will be the combined effects bomblet, which has a shaped charge in it, or an incendiary charge, which is ideally suited for those semisoft or soft targets, that is, Backfire bombers and revetments, radar sites, and certain C^3 sites, such as radars, command and control.

Therefore that [deleted] conventional land attack number will be made up of both the unitary warhead version and the dispenser version.

Senator QUAYLE. Now, then, to hit the targets on the land inside the Soviet Union, how close do we have to get to use the conventional land attack missile? We would have to get pretty close, wouldn't we?

Admiral HOSTETTLER. Our specification for the conventional missile is a CEP of less than [deleted] and that [deleted] certain [deleted] are available.

Now, given the CEP of [deleted] with that 1,000 pound Bullpup warhead, we have kill capabilities, let's say, on the [deleted] in the [deleted] and up area; that's [deleted] on a [deleted]. The kill mechanism for a [deleted] is to ensure they can't get [deleted] for at least [deleted]—that's what you are trying to do.

In the case of a [deleted] a structure, then we have a neutralization factor of [deleted] with that CEP of about [deleted] percent of the building destroyed.

Now, you can say that on [deleted] you may get [deleted] and [deleted]. But it is roughly those kind of numbers.

It's a good warhead. It has good penetration—26 feet of soil, 21 inches of reinforced concrete. And [deleted] or less is the kind of kill mechanism that is considered good.

BACKFIRE BOMBERS

Senator **Quayle**. Now, to get the Backfire bombers which they have located in the Soviet Union, how close do we have to get?

Admiral **Hostettler**. Well, the ideal way to kill the Backfire is, of course, that dispenser warhead that I was talking about. What you do is you can fly horizontally down that runway and we can dump out the series of bomblets, if you will and take on one, two, or three targets. We have already tested those, taken from Air Force preproduction lines on a B-29 in a revetment. They were successfully tested. We got good coverage and we got a good kill mechanism, too.

Senator **Quayle**. But to fire that from the submarine, or to fire it from the surface ship, from where do you have to launch it?

Commodore **Bacon**. You have to be at a certain standoff range, within the range of the Tomahawk land attack itself.

Senator **Quayle**. I realize that, but what are we talking about geographically? I think you are going to see that our best capability is going to be to fire those nuclear tipped warheads because of the longer range, rather than the conventional warheads. That is the question I want to get at.

What is the difference in position that we have to get to build the fire to get to [deleted].

Admiral **Hostettler**. If [deleted].

Senator **Quayle**. But you don't have that range on this. The chart said [deleted].

Admiral **Hostettler**. On the [deleted] mile one——

Senator **Quayle**. You have to get in pretty close.

Admiral **Hostettler**. It depends on how far inland that target is.

Senator **Quayle**. Where are [deleted]?

Admiral **Hostettler**. There are an awful lot of [deleted].

Senator **Quayle**. What if you want to get targets that are inland?

Admiral **Hostettler**. [Deleted.]

Senator **Quayle**. That's not inland. That is up on the tip.

Admiral **Hostettler**. Well, our first priority in the Navy is to treat the [deleted] which is a serious threat. If you are talking about a coordinated strike, the one thing you would like to do is to get the [deleted].

That [deleted]. So, most of that primary [deleted].

Senator **Quayle**. Firing from where?

Admiral **Hostettler**. From [deleted] miles at sea.

Senator **Quayle**. Where does that put us that we have to get to? Are you looking off the coast of Britain? Where are we looking at?

Commodore BACON. Well, you would be [deleted] and you can draw the arc, say, [deleted].

You are correct that [deleted].

Those are the types of dividing lines that you have.

Senator QUAYLE. I think, as you talk about going in a more conventional direction, it has been advanced by the Secretary and others that, you know, this range, where we find out there is this difference—and I understand the payload and weight gives a direct tradeoff—well, maybe there is something we could do a little sooner to get more out of the range in those conventional warheads that I think we probably will be using, or at least that I hope we will be using, before we say that the conventional threshold has been eliminated.

When we have a split like that, I think it is a concern, at least a concern to me that I am expressing to you.

Admiral HOSTETTLER. Sir, there is nothing that I would like better than to be able to develop a program that doubles the conventional ranges of the Tomahawk. I believe that technology is coming. It is just a little hard to see right now.

TRIDENT II

Senator QUAYLE. Let me ask another question about the accuracy of the Trident II. Is this going to be more accurate than the Trident I, [deleted]? Are we going to be able to [deleted] have better accuracy than we have in the Trident I?

Admiral CLARK. We will [deleted]. But it will be at least twice as accurate as the Trident I.

Senator QUAYLE. It will be at least twice as accurate?

Admiral CLARK. Trident I right now is about [deleted] feet CEP at 4,000 miles. The Trident II present estimate is about [deleted] feet at that same range.

I should point out that at less than 4,000 miles, the accuracy is somewhat better than that—if you reduce the range.

Senator WARNER. Senator Quayle, would you yield to me for a minute. I have been here since 9 o'clock and I have to attend another meeting.

Would you and Senator Thurmond take over the duties of the chair, recognizing a rule which allows our colleague, Senator Exon, the ranking minority member, to participate here. I believe you have had about 10 minutes. Perhaps you could yield to Mr. Exon.

Senator QUAYLE. I get the message, Mr. Chairman.

I will yield. I just wonder about that one question on accuracy, where I have a followup, and I would be glad not to go for longer than 10 minutes.

Senator WARNER. I think it is a very important question. The bottom line to that question is you would have to go back and rebuild this whole missile to get additional range with the payload you are now delivering conventionally, isn't that it?

Admiral HOSTETTLER. You can't get something for nothing, Senator. You have so much weight in the warhead and you need so much fuel, you can't push it any further now.

Senator WARNER. Why didn't we build a nuke warhead for an antiship mission?

Admiral **Hostettler**. Why did we not?

Senator **Warner**. Yes.

Admiral **Hostettler**. It was believed that the 1,000 pound Bullpup warhead had a sufficient destructive force against a ship target that it was not worth going to a nuclear antiship version.

D-5 TYPE II

Senator **Quayle**. I will just ask my one followup question, Mr. Chairman, and then will yield to Senator Exon.

Are we using any of the technology on the smaller ICBM midgetman or whatever you want to call it, the technology for accuracy in the D-5 type II? Are we going to use any of that technology?

Admiral **Clark**. I think I would turn it around a little bit.

They are certainly building on the technology of Trident II, but this Trident II comes along before the small ICBM does.

Senator **Quayle**. But accuracy is one of the key components of that.

The whole drive right now is to get as much accuracy as possible. When you get more accuracy, then less megatonnage is needed. That is the principal objective.

Admiral **Clark**. Right, that is the principal objective.

Senator **Quayle**. That is why I am wondering about the interplay between the Midgetman and the technology—really, the driving force of that is the accuracy—and what we are doing in the D-5 program, the Trident II program, to get that exchange. Is there a good exchange, communication and sharing? Are we going to be able to get it more accurate because of this missile and our drive for accuracy?

Admiral **Clark**. You have to be a little bit careful, because one of our principal contributors to accuracy is the navigation system in the submarine, which, of course, is not a problem to the ICBMs. That is one of the biggest technical areas that we are working on in Trident II. But, as far as the guidance system accuracy in the missile, we have a very good working relationship with the ICBM project office, both for MX as well as the smaller ICBM. So, the technology we are using in Trident II really is developed on the MX technology, as well.

Senator **Quayle**. Well, the MX technology accuracy is important, but also the megatonnage. The large missile is also important.

If I read you correctly, there is a new approach to a hard target kill capability, where we are really placing, as I think we should be, much more emphasis on accuracy. That is what I am trying to gather from you gentleman here, that pattern is continuing.

Admiral **Clark**. In killing a hard target, accuracy is much more important than yield. There is a bigger payoff in accuracy than there is in yield.

Senator **Quayle**. There certainly is. I just wanted to be sure that we would be able to capitalize on that.

I would yield now to Senator Exon, Mr. Chairman.

Senator **Thurmond**. Senator, excuse me. I cannot be here but for another few minutes. I have to leave to chair another meeting, so I would ask you simply to take charge of this meeting.

Senator **Quayle** [presiding]. Certainly.

Senator **Exon**. Let me say that I did not ask for your questioning to be interrupted, Senator Quayle. I thought you were doing a good job and was interested in the responses that you elicited from our distinguished panel.

Gentlemen, you may have covered this earlier, and if you have in detail, I can look at the record.

D-5, TRIDENT II PROGRAM

I remain very much interested in and concerned about the D-5, Trident II program, how it is coming, what can we do to speed it up, if anything, and whether there has been any change in the IOC. As I understand it, listening to the questions of Senator Quayle, the D-5 is supposed to have essentially the same accuracy as the MX. Am I still correct?

Admiral **Clark**. I believe their objective is a little bit better than ours. The principal reason for that is they do not have to contend with the navigation problems that we do since we are a moving platform. But we are in the same ballpark, sir.

Senator **Exon**. Now, as to my other question, it is directed to whichever one of the panel would like to respond.

Admiral **Clark**. Well, in response to your questions on Trident II, the program indeed is going very well. We are still on the same schedule that we indicated to you last year. Everything has gone in accordance with that schedule. We are now in full-scale engineering development. Today, in fact, we are signing our engineering and development contracts.

The IOC remains December 1989, and frankly, everything is on track to meet that schedule with the performance that we have estimated.

Senator **Exon**. Admiral, let me ask another question that I have asked before. If we went on a crash program, could we advance that 1989 date to 1988, or 1987?

Admiral **Clark**. Well, 1989 is what it is right now. I indicated earlier in answer to the same question that I do not believe, as program manager, that we can accelerate the program and still meet the very important performance objective of accuracy.

Senator **Exon**. Do I interpret that to mean that we are on the fastest, most reasonable track possible in your judgment?

Admiral **Clark**. Yes, sir.

Senator **Exon**. In other words, if we accelerated funding, we could not accelerate the time?

Admiral **Clark**. I do not believe that we can and still meet our accuracy objectives. We would compromise that significantly.

Senator **Exon**. Mr. Chairman, I don't know what classified level we are at here. I will just ask a general question and if you experts feel that I am getting into an area that should not be discussed in the present climate, just say so and we can arrange some other kind of briefing.

I am interested in what you can tell us today from a year ago as to what improved [deleted] technology we have and how is it coming on the whole wide range of missiles that we know about. Is that an area that we can get into?

Admiral **Clark**. I think certainly we can get into it.

We have right now, in the Office of the Secretary of Defense, a study that is underway with both Air Force and Navy participation to determine what sort of [deleted] program we should be pursuing for both the ICBMs and the SLBMs. This is in recognition of the significant efforts and technology developments that have occurred in the USSR.

That study probably will be completed within the next month, and from that I would expect there will be a program determined for both the SLBMs as well as the ICBMs with regard to specifically what we are going to do [deleted].

Senator **Exon**. Can you cite in the climate we are in what strides we have made in that general area in the cruise?

Admiral **Clark**. The cruise missile? I will have to defer to Admiral Hostettler.

Admiral **Hostettler**. Senator, I think we are in a subject area relative to the cruise missile that I don't believe I can comment on here at this time, sir.

Senator **Exon**. I have discussed this with Chairman Warner and he indicated very positively that I think maybe we should be brought up to date on it. I guess that would take a special arrangement of some kind, and I wish we could get into that particular area. The reason I am asking these questions, gentlemen, is in the subcommittees, and in the Armed Services Committee, and in the Budget Committee, and, individually, in the Appropriations Committee, there is a war of words being waged now as to what we are going to do about this budget.

There are those of us who are very much concerned that we get the proper input as to what options are or are not available to us as we address our overall defense posture, and the continuing concern that I have that oftentimes we get so taken up with exotic new weapons programs that we sometimes forget the fact that we just don't have the money to do everything that we would like to do, as if we could give you a blank check.

One of the complaints on both sides of the aisle, I think I can say today, is that we just are not getting the information to make a decision on the options that might be available, and sometimes it is to the point where we feel, not intentionally, but that maybe that we are not asking the right questions to get the facts that we need to make those rather weighty decisions and go about trimming the budget request for the President.

Whether you agree with that or not, I think it is a fact of life that it is going to be cut. Many of us are very much concerned that we not cut off our nose to spite our face, so to speak, in moving our defense forward. And, there is the major concern that at least this Senator has with regard to readiness, readiness, readiness. While I do not underestimate the Soviet Union for a moment in any area, I still have the strong suspicion that we are more likely to be tested in the conventional area than we are by the threat of a nuclear exchange.

I don't mean that one is necessarily more important than the other, but we have to have the right balance.

Those are all the questions that I have, Mr. Chairman, and, gentlemen, I thank you all for coming.

Senator **Quayle**. Thank you, Senator.

I just have a couple of general questions.

SOVIET SEAPOWER ADVANCES

If you were looking to the advances that the Soviets have made in seapower over the last 3 or 4 years from a technological improvement position, on a qualitative basis, where have they come?

How would you describe Soviet advances?

Commodore Bacon. Well, I can speak to some advances which they have made in their submarine force.

The year before last, they launched and have now put to sea the *Typhoon* SSBN, which is a follow-on to modernize their total SSBN force. It is their first really new SSBN since the *Yankee* class in the late 1960's. A modernized MIRVed missile is increasing their capability in the strategic force. They launched two new classes of SSN's in their submarine force last year, and completed a total of seven submarines, including diesels. I believe that they also are using technology to become quieter with their SSN force and their submarine force in general. That is a situation in which we will have to use our research and development to develop a new type of SSN to stay ahead of that type of threat.

I think they have made strides in developments with technology in their submarine force.

Senator Quayle. So you would put their principal technological improvement on a qualitative basis in their submarine force?

Commodore Bacon. That is one area.

Senator Quayle. Would that be your major point of reference as far as making improvements? Also, would that be the major point of reference that is your greatest concern?

Commodore Bacon. I just mentioned those because that is the type of area that I am more familiar with. They have made qualitative improvements in their surface ships, too, with new cruise missile systems. They are continuing to develop their conventional takeoff carrier, which will be another threat—it is a continual push by the Soviet Union—with the ability to use much more quantitative and some qualitative improvements than we are capable of using our dollars to defend against.

Senator Quayle. Well, let me ask the question in reverse.

What do you perceive as the greatest threat to our sea-based deterrent? What scares you the most about the Soviet Union regarding our strategic sea-based deterrent?

Commodore Bacon. Right now, I think it is their continual buildup of their submarine force and in the limited future of a few years, anything that they might field against our strategic force would be in the acoustic detection field.

We have briefed on the total picture of our SSBN security and looked at other technology in non-acoustic ASW. But for the immediate future, I think it would be their SSN force.

SOVIET SUBMARINE THREAT

Senator Quayle. So, basically, in answer to both of those questions, you have focused on the Soviet submarine force?

Commodore Bacon. Well, you asked the question on the threat against our strategic force.

Senator QUAYLE. You are looking at the submarines.

Now, to counter that, where is our major emphasis being placed to counter this major threat that we have from the Soviet Union? Is it in new ASW? What are we talking about?

Commodore BACON. Part of our initiative is to develop a new class SSN as a follow-on to our 688 class, and to get a submarine which is more ASW capable, more capable through its ability to carry more weapons and its ability to be much quieter, to stay ahead of the possible breakthrough in acoustic development of their submarines.

Tom, would you like to add anything on the new SSN?

Commodore FOX. The new SSN will provide us our first new attack submarine in 17 years.

Senator QUAYLE. Will this take care of the Soviet threat in submarines and what they have been doing in improving theirs? Is that our response?

Commodore FOX. That is part of it. Yes, sir.

Maybe I missed the question.

Senator QUAYLE. Well, the question is this. I am trying to look at a policy determination of what you judge to be the biggest threat that we have, from a strategic force standpoint. I asked what concerned you most about the Soviets. I asked what the biggest problems we have are, and both those answers came up as submarines.

Then I said what are we doing about it. The answer came back that we were going to build a new class of SSN. That was the answer.

Commodore BACON. Sir, that certainly is part of it. We also have in this year's budget four improved 688's, continuing on with our 688 class SSN program.

Admiral HOSTETTLER. If I may comment on the question—I am not sure, Senator, that I understand completely what you have said. I thought you were talking more about a broad structured Navy, not from an undersea force, as such.

Senator QUAYLE. I was asking about overall sea-based deterrent—surface, submarines, you name it.

Admiral HOSTETTLER. I am sure that one would not argue with Commodore Bacon, in regard to the extent and growing [deleted]. Unfortunately, the [deleted].

It would seem to me that our intelligence clearly indicates a rather [deleted]. Also [deleted] which was not true 10 years ago.

So, the [deleted]. If you mean our ability to strike with [deleted] sources, if that is what you are referring to.

If you are talking about our primary tactical strength capability, the carrier, and our surface units surrounding it, then the threat is not only the Soviet submarines, but massive [deleted] and their [deleted].

We are talking about surface groups and air groups which now have invited us to look at [deleted]. They are [deleted], they are [deleted] and they have [deleted].

The [deleted] are equipped with those kinds of missiles. Their surface ships are equipped with those missiles, as well as the submarines.

So, I think we have to look at all of the area of naval warfare. I think that their approach is a rather [deleted].

Senator **Quayle**. OK.

Thank you all, gentlemen.

Unless there are any additional specific requests that the chairman has made, and I am not aware of any, I want to thank you for your testimony and say that we look forward to working with you on this and other matters of mutual concern.

[Questions with answers supplied follow:]

Questions Submitted by Senator John Warner

SALT I LAUNCHER LIMITS

Senator **Warner**. Please comment on the relationship between SALT I launcher limits, Air Force plans to dismantle Titan silos, and Navy plans to continue to operate SALT I accountable submarines?

Commodore **Bacon**. To date, the United States has dismantled six Polaris submarines in order to remain under the SALT I Interim Agreement limit of 656 ballistic missile launchers on submarines. All Polaris submarines have been previously removed from strategic service, but remain accountable until dismantled under SALT counting rules. In the fall of 1983 the U.S. began dismantlement of deactivated Titan ICBM silos in order to increase the allowable submarine launched ballistic missile (SLBM) limit to 710, as allowed by the SALT Interim Agreement. Current U.S. policy is based on the President's statement that the United States will refrain from actions which undercut existing strategic arms agreements so long as the U.S.S.R. shows equal restraint. As new Trident submarines enter the U.S. inventory, compensating dismantlements are taking place.

SALT II COMPLIANCE

Senator **Warner**. When do Trident submarine deployments cause the total number of MIRVed missiles to exceed SALT II limits? What provisions are included in the fiscal year 1985 budget regarding continued compliance with SALT II? Do you plan to reduce the number of operational SSBNs if the United States continues to comply with SALT II limits after 1985?

Commodore **Bacon**. The total accountable inventory of U.S. MIRVed ballistic missile launchers will exceed the SALT II sublimit of 1200 when U.S.S. *Alaska* (SSBN 732) begins sea trials. [Deleted.]

Questions Submitted by Senator Strom Thurmond

FIBER OPTICS TECHNOLOGY IN ASW

Senator **Thurmond**. Dr. Harper, it is my understanding that we have applied fiber optic technology to ASW. Would you elaborate on this for us?

Dr. **Harper**. There are two applications of fiber optics technology being pursued by the Navy for use in ASW: signal transmission, and acoustic sensing. Fiber optics have been used for several years as communications links in commerical applications. This technology is being evaluated for Navy use as a replacement for copper wire to carry sonar signals from the Hydrophones to amplifiers because of its light weight, strength, suitability in a water environment, and potential low cost.

[Deleted.] Fiber optics appears to be a light weight, low cost approach to acoustic sensor systems, [deleted].

SA-X-12 IN ABM MODE

Senator **Thurmond**. What difficulties will the SA-X-12 pose for our SLBM warheads if the Soviets deploy it in an ABM mode?

Commodore **Bacon**. [Deleted.]

U.S. LEAD IN ASW TECHNOLOGY

Senator **Thurmond**. Dr. Harper, how many years ahead of the Soviets are we in ASW technology?

Dr. **Harper**. That is a question which I can't answer in a specific number of years because Soviet military research is done in a closed environment. [Deleted.] The Soviet's ASW capability could make a major step forward if they gained access to our latest sensor or processing technology.

QUESTIONS SUBMITTED BY SENATOR DAN QUAYLE

CONVENTIONAL WEAPONS AND DETERRENCE

Senator **QUAYLE**. Assuming that it is a nuclear war we are most anxious to deter, wouldn't our assignment of conventional weapons where possible to tasks currently assigned to nuclear weapons work to strengthen deterrence?

Commodore **BACON**. Our policy is to deter war at all levels of conflict. Assigning conventional weapons in place of nuclear weapons does not strengthen deterrence. The best estimates of our intelligence community are that Soviet targets are getting harder, and are not suitable for conventional attack. In general, nuclear weapons are developed only when there is no satisfactory conventional capability. We are not capable of developing and producing sufficient numbers of conventional weapons to match the destructive capability of our nuclear weapons. To attempt to do so would weaken, not strengthen, deterrence.

SEA LAUNCHED CRUISE MISSILE [SLCM] TARGETING

Senator **QUAYLE**. In the Defense Department's Annual Report to Congress (pages 143-46) great emphasis is given to assuring the defense of surface fleet against Soviet Air Launched Cruise Missiles (ALCMs) delivered from Soviet land-based aircraft and Soviet Sea-Launched Cruise Missiles [SLCM's] launched from Soviet submarines and Soviet surface ships. Allowing, as the Report does, that the "best way to counter this threat is to develop systems that can detect and engage Soviet forces before they come within range of launching their missiles," wouldn't it make sense for the Navy to be able to attack Soviet aircraft at their land bases before they took off? Wouldn't this, in fact, be in the best tradition of the Navy's multi-layered defense in depth concept?

Admiral **HOSTETTLER**. Attacking Soviet aircraft at their land bases before they take off is a very effective way to suppress an attack and would enhance the survivability of the battlegroup as a whole. Conventional land attack Tomahawk can provide one method of doing this.

TOMAHAWK LAND ATTACK MISSILE-CONVENTIONAL [TLAM/C] TARGETING

Senator **QUAYLE**. Earlier in the same report DOD notes that the Tomahawk cruise missile will "be based aboard large numbers of surface ships and submarines, giving them a capability to strike enemy surface ships and shore targets beyond the horizon." Yet, in the Report's discussion of its Anti-Air Warfare Programs, DOD fails even to list the Tomahawk (except as a possible anti-ship weapon to be placed on the new DDG-51 Guided Missile Destroyer) and instead emphasizes the utility of land and sea based U.S. aircraft to counter Soviet bombers. Are U.S. conventionally armed land attack cruise missiles launched from U.S. submarines incapable of threatening Soviet naval aviation based at Cam Ranh Bay, Afghanistan, South Yemen, and the Trans Caucasus?

Admiral **HOSTETTLER**. The Tomahawk missile is not categorized as an Anti-Air Warfare Program: The Anti-Ship variant is considered to be an Anti-Surface Warfare Weapon and the two land attack variants are considered to be Strike Warfare weapons.

The U.S. Conventionally armed land attack cruise missile is still under development. The submarine launched and ship launched versions will be able to range Soviet naval aviation based at Cam Ranh Bay, Southern Afghanistan, South Yemen and in the Trans Caucasus region.

SLCM/ALCM VULNERABILITY

Senator **QUAYLE**. Would conventionally armed land attack SLCMs launched from U.S. submarines against fixed Soviet naval aviation base targets such as base revetments, taxi ways, parking aprons, missile loading and storage facilities, and fuel and munition stores be more vulnerable to Soviet countermeasures than ALCMs launched from carrier based aircraft?

Admiral **HOSTETTLER**. There is currently no land attack air launched cruise missile in the U.S. inventory capable of being launched from carrier based aircraft.

There is no difference in the detectability of the SLCM once it leaves the launch platform. Since a submarine could be expected to get to a launch area more covertly than a surface ship, this could enhance overall cruise missile survivability.

NUCLEAR LAND ATTACK SLCM

Senator **Quayle**. Given that the nuclear land attack SLCM now has a range of approximately 1,500 miles and that the conventionally armed land attack SLCM has nearly half this range due to its heavier warhead, wouldn't it be helpful to nuclear deterrence if we could increase the range of the conventionally armed land attack SLCM to 1,500 miles or even greater?

Admiral **Hostettler**. An operational range increase for the conventionally armed land attack Tomahawk missile would give the operational commander increased tactical flexibility in targeting, which may add to strategic deterrence.

The conventional land attack missile is still in development and the current operational range is limited by the missile's physical configuration. As the system matures, technological advances may allow operational range increases.

ATTACK NUCLEAR SUBMARINE

Senator **Quayle**. The DOD report (on page 149) describes the development of a new attack nuclear submarine that "will carry more weapons than previous classes (including the SSN-688)." Are there any plans now to develop a larger conventionally armed land attack SLCM capable of ranges in the 1,500 mile category for deployment for this more "accommodating" attack submarine?

Admiral **Hostettler**. We have initiated preliminary investigation into the desirable characteristics of a follow-on cruise missile to Tomahawk; increased range is one of the characteristics that is desired.

Senator **Quayle**. Do we have any occasion to protect our ballistic missile submarines with our nuclear attack submarines?

Commodore **Fox**. [Deleted.]

CONVENTIONAL SUBROC

Senator **Quayle**. Would our attack submarines' use of SUBROC and nuclear Harpoon against Soviet submarines and surface ships pose communication problems and are these problems sufficient to warrant the development of conventionally armed substitutes for SUBROC and nuclear Harpoon?

Commodore **Bacon**. The employment of SUBROC against Soviet submarines by our attack submarines would not pose any significant communications problems as the nuclear burst effects are largely confined underwater, resulting in little atmospheric disturbance. The Harpoon is a conventionally armed weapon only, and there are no plans to provide a nuclear warhead for it.

USE OF TACTICAL NUCLEAR WEAPONS

Senator **Quayle**. Recently, The Chicago Sun-Times (23 Feb. 1984) ran an article on the SS-NX-22 Soviet conventional anti-ship cruise missile threat. In this article it was suggested that the Navy's answer included deployment or development of a nuclear surface-to-air missile (SM-2) and a nuclear anti-submarine munition. Under what conditions would our use of these nuclear munitions first be to our advantage? Is there any situation under which our use of nuclear weapons at sea would help us to turn the tide after the Soviets had made a coordinated, massive nuclear first attack against our naval battle groups?

Commodore **Bacon**. The Navy is not developing or deploying nuclear weapons to respond to a conventional threat. Nuclear surface-to-air missiles and anti-submarine weapons are necessary to deter and, should deterrence fail, to counter large scale Soviet nuclear attacks on our battle groups. Actual conditions under which the use of nuclear weapons at sea would be authorized are heavily scenario dependent. Such use would, in any case, require authorization by the President. [Deleted.] In particular, if the Soviets make a massive nuclear attack against one battle group, strikes against subsequent battle groups would be presumed to be nuclear. In this situation the use of defensive nuclear weapons by the United States would help to turn the tide.

Senator **Quayle**. Is it Navy policy to try to improve the accuracy of our missile systems?

Commodore **Bacon**. Yes, it is Navy policy to improve the accuracy of our missile systems where we can thereby increase military effectiveness.

TRIDENT II YIELD

Senator **Quayle**. In answer to the freeze movement, the administration has presented charts that make it quite clear that the average yield per warhead in our stockpile has gone down since the early 1960's. These charts were used to demonstrate that modernization of our weapons has resulted not only in a gross reduction in destructive power for the entire stockpile, but also a reduction in the destructiveness of our weapons' design in general, What has made such destructiveness reductions possible is improvement in our delivery systems' accuracy (a 10-fold reduction in delivery inaccuracies makes a 1000-fold reduction in warhead destructiveness possible without any reduction in the system's likelihood of destroying the target in question). With these points in mind, how does the Navy justify [deleted] warhead yields [deleted] from the Trident I to the Trident II missile even though the later is advertised to be much more accurate a system than Trident I?

Commodore **Bacon**. The hardening Soviet target base is the fundamental reason we need to develop the [deleted] warhead for the Trident II (D-5) missile. Trident II, [deleted] will be more accurate that Trident I. *Both* improved accuracy *and* higher yield are required to satisfy the Presidential mandate for our survivable systems to achieve a hard target kill potential. [Deleted.] Furthermore, there is a practical limit to the amount we can improve accuracy. As we approach that limit, only increased yield can maintain an acceptable probability of destroying the target.

TARGET HARDNESS ESTIMATES

Senator **Quayle**. To what extent did the Navy rely on Air Force calculations concerning the possible hardness of Soviet targets when it considered employing the MK 87 warhead (which was originally designed for deployment on the MX) for possible use on Trident II?

Commodore **Bacon**. We used Defense Intelligence Agency (DIA) estimates of Soviet target hardness in evaluating warhead candidates for the Trident II (D-5) missile. One candidate was a nominal [deleted] warhead, but it was not [deleted].

TRIDENT II (D-5) MISSILE GUIDANCE SUB-SYSTEM

Senator **Quayle**. March 5th's Aviation Week featured an article indicating that the DOD was planning to spend nearly $1 billion to provide terminal guidance technology for the small ICBM. The article said that DOD is "likely to include adaptations of the terrain contour matching system currently in use in our cruise missiles and of the radar area correlation guidance similar to that deployed on the Pershing II." Why isn't such a guidance program being pursued for the Trident II?

Admiral **Clark**. Currently, Trident II (D-5) program objectives can be adequately supported by pursuing the conservative, well established, stellar-inertial guidance technology, thus advoiding the more costly and complex terminally guided [deleted] re-entry vehicle.

Questions Submitted by Senator Sam Nunn

ARMS CONTROL RETIREMENTS

Senator **Nunn**. Your statement expresses the intent to keep all 31 Poseidon submarines in the inventory until the early 1990's, "unless modified for arms control reasons." Since the SALT treaties would all have expired by the end of CY 1985, what "arms control reasons" exist that would lead to retirement of any of these submarines?

Commodore **Bacon**. Current U.S. policy was stated by the President on May 31, 1982, at the time of his announcement of the beginning of START negotiations: "As for existing strategic arms agreements, we will refrain from actions which undercut them so long as the Soviet Union shows equal restraint." U.S. policy beyond 1985 has not been announced. If, for example, the deep reductions being sought by the administration are achieved, dismantlement of Poseidon submarines may be required.

TRIDENT II (D-5) WARHEAD YIELD

Senator **Nunn**. What option will exist to fit a larger-yield warhead to the Trident II than currently planned? What yield options and numbers of RVs per booster are possible?

Admiral **Clark**. The Trident II (D-5) missile is being designed to carry up to [deleted] re-entry vehicles with warhead yields of [deleted] or up to [deleted] re-entry vehicles with warhead yields of [deleted].

There are no design options presently being pursued that would permit the Trident II (D-5) to carry, without modification, re-entry vehicles having warheads with yields greater than [deleted]. Warheads with yields greater than [deleted] could be carried on Trident II (D-5), but only after major modifications to the current missile design.

OVERHAUL OF SSBN'S NEAR FUEL DEPLETION

Senator **Nunn**. Describe your current plans for overhaul and refurbishment of the six SSBN's closest to fuel depletion at present. Are the funds for such overhaul and reactor core replacement in the fiscal year 1985 and 1986 requests? In the Navy's fiscal year 1985-1989 POM? In what amount?

Commodore **Fox**. The Navy currently plans to refuel and overhaul [deleted] SSBN's closest to fuel depletion. The [deleted] funds for these actions are in the fiscal year 1985 budget request and in the Navy 1985-89 POM. The funds programmed for these six SSBNs are shown below.

O&M, N

[In millions of dollars]

Fiscal year:	
1985	530.5
1986	153.9
1987	4.3
1988	4.3
1989	4.3

Senator **Quayle**. Thank you all very much.

This subcommittee is now adjourned.

[Whereupon, at 11:55 a.m., the subcommittee adjourned, to reconvene upon the call of the Chair.]

DEPARTMENT OF DEFENSE AUTHORIZATION FOR APPROPRIATIONS FOR FISCAL YEAR 1985

THURSDAY, MARCH 15, 1984

U.S. Senate,
Subcommittee on Strategic and
Theater Nuclear Forces,
Committee on Armed Services,
Washington, DC.

SPACE DEFENSE

The subcommittee met in executive session, pursuant to notice, at 9:14 a.m., in room 232A, Russell Senate Office Building, Senator John W. Warner (chairman) presiding.

Present: Senators Warner, Quayle, Wilson, Nunn, Exon, and Bingaman.

Also present: James F. McGovern, staff director and chief counsel; Arnold L. Punaro, staff director for the minority; Brenda K. Hudson, assistant chief clerk; Robert F. Bott, William E. Hoehn, Jr., George K. Johnson, Jr., and David S. Lyles, professional staff members; Douglas R. Graham, research assistant; and Karen A. Love, staff assistant.

Also present: Les Brownlee, assistant to Senator Warner; Robert Savitt, assistant to Senator Cohen; Bernard R. Toon, assistant to Senator Quayle; Mark J. Albrecht, assistant to Senator Wilson; Francis J. Sullivan, assistant to Senator Stennis; Jeffrey B. Subko, assistant to Senator Exon; Peter D. Lennon, assistant to Senator Levin; Edward McGaffigan, Jr., assistant to Senator Bingaman.

OPENING STATEMENT BY SENATOR JOHN W. WARNER, CHAIRMAN

Senator Warner. The subcommittee is anxious to get under way and we are going to ask counsel to secure the room such that we can hold an executive session, and then around 10 a.m. we will go into open session. I apologize for any delay or inconvenience.

I will insert my statement for the record.

[The prepared statement by Senator John W. Warner follows:]

Prepared Opening Statement by Senator John W. Warner

The subcommittee convenes this morning to receive testimony on U.S. space defense matters in review of the fiscal year 1985 Defense Authorization Bill. In particular, we will address Soviet military space capabilities and the U.S. anti-satellite program. I would like to welcome our witness, Richard Perle, the Assistant Secretary of Defense for International Security Policy.

The U.S. ASAT program has been the source of some concern in the Congress. I look to today's session to address many of these concerns, and to provide the basis upon which we make our recommendations on this important program.

Following this portion of this morning's hearing, we will receive testimony on our Civil Defense program. I will have a brief opening statement for that portion of today's hearing at that time.

Senator **Warner**. Secretary Perle, will you give us a synopsis of your submitted statement, which is classified secret, and then we will hold the intelligence briefing and then we will proceed into open session.

STATEMENT OF HON. RICHARD N. PERLE, ASSISTANT SECRETARY OF DEFENSE (INTERNATIONAL SECURITY POLICY), ACCOMPANIED BY MAJ. BRYAN L. STEADMAN, ACTING CHIEF, SPACE SYSTEMS BRANCH, DEFENSE INTELLIGENCE AGENCY; AND CAPT. RODNEY P. LIESVELD, SPACE INTELLIGENCE REQUIREMENTS MANAGER, DEFENSE INTELLIGENCE AGENCY

Mr. **Perle**. Mr. Chairman, if you do not mind, I would prefer to defer until we have had an opportunity to hear the briefing that DIA will present.

Senator **Warner**. Let us do that, then.

Mr. **Perle**. Among other things, it is the sequence in which I became involved in this issue. To be frank about it, it is an issue to which I had not paid very close attention. Some months ago I asked for and received a series of intelligence briefings on the scope of the Soviet program and was so impressed with the magnitude and effectiveness of that program I began to take a much greater interest in the issue of what we ought to be doing.

So I think it is awfully useful to begin with the intelligence, which is illuminating.

Senator **Warner**. In my recollection, in the closed session yesterday you answered two questions propounded by myself, the first being that we were behind the Soviets and they were ahead. That was in open session. Is that not correct?

Mr. **Perle**. Yes, certainly with respect to the most menacing of the Soviet satellites, [deleted].

Senator **Warner**. And the second one was that the verification problem here is so enormous that it may well be insoluble.

Mr. **Perle**. I believe it is insoluble and I think the reluctance to say that is institutional and bureaucratic and people will use terms like "extremely," when in fact what they mean is impossible.

Senator **Warner**. I think we have been able to make that clear in the record.

So as we proceed perhaps you can make some notes drawn from the intelligence briefing which we can agree upon as being not compromising so that we could make some statements to the public because I think, gentlemen and ladies, to the extent we can dispel some of the myths about this program in the public we have a better likelihood of achieving congressional support for this program, perhaps even public support.

So now we will proceed with the briefing by the Defense Intelligence Agency.

STATEMENT OF MAJ. BRYAN L. STEADMAN, ACTING CHIEF, SPACE SYSTEMS BRANCH, DEFENSE INTELLIGENCE AGENCY

Major **Steadman**. Thank you, sir. My name is Bryan Steadman from DIA. Today we are going to talk about the Soviet space warfare capabilities.

I will first touch briefly on the doctrine we feel the Soviets are employing in space, their current systems that are fielded at the moment, how they have utilized those systems in past crises in the world, new systems that are being deployed, how we anticipate those being used, and then conclude with some key judgments.

We find as far as 19 years ago, nearly two decades, the Soviets recognized in one of their publications, The Dictionary of Basic Military Terms, that mastery of space was an important prerequisite in achieving victory in war. Those things we have seen them accomplish——

Senator **Warner**. Is that an open statement?

Major **Steadman**. Yes. This is an unclassified publication.

Senator **Warner**. It would be helpful if we can get that.

Major **Steadman**. The things we have seen them do in space are consistent with this philosophy and this doctrine.

Senator **Warner**. Let us hold that slide out.

[Slide deleted.]

Major **Steadman**. [Deleted.]

Senator **Warner**. Even though that is classified secret, Mr. Perle, yesterday you gave us a hypothetical experience during the war with the Nazi submarines and drew a parallel to today. I am hopeful you can do that once again.

Mr. **Perle**. I should think so.

Major **Steadman**. [Deleted.]

[Slide deleted.]

In addition to these systems, the Salyut satellite shown here is part of their manned program. This is a mockup of the Salyut 7, which is currently flying and manned with two cosmonauts.

This is [deleted] Salyut and a progress of Salyuz-type spacecraft [deleted]. This is the ferry-type craft that brings the cosmonauts to the space station. It is also the resupply vehicle that has successfully now docked automatically without manned assistance 19 times.

The space station does give them the capability for extended R&D test bed operations in space. It is a long lifetime system. The Salyut 6 space station which flew prior to the one that is now in orbit was operational for nearly 5 years, and the Soviets logged more man days in space during that mission than we have in our entire space program.

Some disadvantages are that it has limited capacity and coverage inasmuch as it is not always manned and there is only one of them in operation.

[Deleted.]

Senator **Warner**. This is not marked with a classification. Is that open?

[Slide deleted.]

Major **Steadman**. This is a secret slide. It is marked that way on the slide frame.

Senator **Warner**. I might suggest that it be on there for greater clarity because oftentimes Members will takes notes, relying on what is on the screen as opposed to what may be on the margin of that card.

Major **Steadman**. Yes, that should be corrected. This is a secret slide. Nearly every slide we have in this package is secret.

Senator **Warner**. I am following this very carefully trying to document in my own mind what to release to the public.

Major **Steadman**. The first slide with the doctrine statement is open. Virtually everything else is classified.

[Slide deleted.]

Turning now to their ASAT capabilities, [deleted].

Senator **Warner**. [Deleted.]

Major **Steadman**. Yes. I have two subsequent slides that will explain the exact operation which will be a little easier to talk from.

[Deleted.]

I will now in the next couple of slides explain in a little more detail how it operates.

[Slide deleted.]

[Deleted.] The next slide will show exactly how this is accomplished.

[Slide deleted.]

[Deleted.]

Senator **Warner**. Now what altitudes can it operate at and what percentage of our satellites are within that band?

Major **Steadman**. [Deleted.]

Senator **Warner**. What about other nations—France, the U.K. and the like? Anyone else?

Major **Steadman**. Do they have systems like this?

Senator **Warner**. Are they vulnerable likewise?

Major **Steadman**. [Deleted.]

Senator **Warner**. I was just thinking if we were engaged in a NATO scenario where the Soviets presumably were targeting all NATO countries, what is the total degradation in satellite capability. Perhaps you can supply that for the record.

Major **Steadman**. Yes, we can find that answer.

[The information referred to follows:]

ASAT

Major **Steadman**. The current operational Soviet ASAT interceptor system has demonstrated a [deleted] in engaging and negating targets in tests conducted over the last dozen or so years. If the Soviets were to operate this ASAT system against satellites supporting the United States and its Allies, our satellites operating at low altitude could be damaged. This class of satellites primarily includes earth-sensing systems [deleted]. High-altitude satellites would not be threatened by this ASAT system. The Soviets also have other capabilities that could possibly be used to threaten our low altitude satellites in time of crisis [deleted.] In addition, it is possible that, unknown to us, capabilities have been or could be developed which threaten all U.S satellites up to geosynchronous orbit.

Due to the potential threat posed by the current Soviet ASAT capability, it is important that we proceed with development of an ASAT capability with operational deployment as a goal. The U.S. ASAT system, when combined with other defensive measures, is necessary to assure a credible deterrent for space weapons and to reduce the threat of Soviet satellites that can aid in targeting U.S. and Allied land-based forces in event of a conflict.

Senator **Bingaman**. Could I ask, Mr. Chairman, is this something that is continually tested? I mean, do they have a frequent test? This is 11 years old, you say—13 years old.

Major **Steadman**. [Deleted.]

Senator **Bingaman**. What kind of results did those tests show?

Major **Steadman**. [Deleted.]

Senator **Bingaman**. OK.

Major **Steadman**. [Deleted.]

Senator **Bingaman**. [Deleted.]

Major **Steadman**. [Deleted.]

Senator **Bingaman**. [Deleted.]

Major **Steadman**. [Deleted.]

Senator **Warner**. We have just had two Members join us. We really arrived at the crux of this briefing just a moment or two ago. Go back and take them through. This is the [deleted] that has been discussed this morning. It can reach to an altitude [deleted].

Major **Steadman**. OK. Which one?

Senator **Warner**. Just explain the system.

Major **Steadman**. This is the only operational antisatellite system in the world, currently operated by the Soviets, [deleted].

This is just showing the scenario.

[Deleted.]

[Slide deleted.]

And this is the slide that we were at, [deleted].

Senator **Warner**. Let me make a summarizing statement. This system in operation—the only one in the world, [deleted].

Senator **Bingaman**. Could I ask one more question? You show this being launched [deleted].

Major **Steadman**. Correct.

Senator **Bingaman**. Do they have the capability to launch from other sites, or would we be in a position—I mean, if they were to use this capability, would we be able to deal with that [deleted] and eliminate the capability?

Major **Steadman**. Let me address that with the next slide.

[Slide deleted.]

[Deleted.]

Senator **Bingaman**. [Deleted.]

Major **Steadman**. [Deleted.]

Captain **Liesveld**. [Deleted.]

Major **Steadman**. That is correct. [Deleted.]

Senator **Bingaman**. Thank you, Mr. Chairman.

Senator **Wilson**. Mr. Chairman?

Senator **Warner**. Feel free to ask questions.

Senator **Wilson**. [Deleted.]

Major **Steadman**. [Deleted.]

Senator **Wilson**. My concern, Mr. Chairman, is the degree to which this needs to remain classified. I do not want to compromise any sources, but if we are not doing that I think we ought to think seriously about declassifying it.

Senator **Warner**. Mr. Wilson, before you arrived Secretary Perle and I consulted with Mr. McGovern. We made a determination that the hearing will open at about 10 a.m. such that we can make a public record with respect to the Soviet threat, Soviet progress, and the Soviet position [deleted] in terms of R&D and operation, so that we in this committee can go to the floor and more intelligently deal with this issue that undoubtedly will arise during the authorization.

Senator WILSON. Thank you, Mr. Chairman.

Senator WARNER. Now the subcommittee will press to see how much can be declassified. This morning we are proceeding with some care, but I am certain that Secretary Perle will go back and discuss this matter with his colleagues to see what volume of material we can extract from this DIA briefing and make it part of the record.

Major STEADMAN. In connection with that, General Williams, the DIA Director, has directed us to generate an unclassified version of this briefing, which we are in the process of doing, and it should be available within 2 or 3 weeks, but we need to determine what of this information can be declassified.

Senator WARNER. That timing is critical, Mr. Perle. We need that as soon as possible.

Mr. PERLE. As you know, we are obliged by legislation to provide you with a report I believe by the end of this month to the Congress which will contain a great deal of information along the general lines of this briefing and our policy in general.

Major STEADMAN. [Deleted.]

Mr. PERLE. I think that is an important point because the suggestion has been made that owing to [deleted]. It looks as though they are in this business to stay.

Senator WARNER. Does it have the capability of distinguishing among satellites—in other words, selectively destroying satellites?

Major STEADMAN. [Deleted.]

Senator BINGAMAN. Let me ask. [Deleted.]

Major STEADMAN. [Deleted.]

Senator BINGAMAN. Do they have them there or are you saying they have the storage capacity for them?

Major STEADMAN. [Deleted.]

[Slide deleted.]

Mr. PERLE. The slide indicates one of the very difficult verification problems that we have, Senator. [Deleted.] You cannot tell until the war starts.

And it points up a very difficult verification problem that, to put it in its most general form, virtually all of the activities associated with an ASAT are identical to the activities associated with satellites themselves.

Senator WARNER. And those satellites in any category could be peaceful ones for simply ocean surveillance, which is the case here, navigation satellites——

Mr. PERLE. Communications satellites. That is right. The process one goes through in putting a satellite into orbit is indistinguishable from the process of putting an antisatellite into orbit. Hence, the crux of the verification problem.

Major STEADMAN. [Deleted.]

Senator WARNER. Now again what percentage of our systems—and you may supply this for the record—are rendered vulnerable by this?

Major STEADMAN. [Deleted.]

Senator WARNER. [Deleted.]

Major **Steadman**. [Deleted.]

Senator **Exon**. [Deleted.]

Major **Steadman**. [Deleted.]

Senator **Bingaman**. Could I ask, Mr. Chairman, on this? [Deleted.]

Major **Steadman**. [Deleted.]

Senator **Bingaman**. Because I have seen some of the [deleted].

Major **Steadman**. [Deleted.]

Senator **Bingaman**. What kind of a [deleted] is that?

Major **Steadman**. [Deleted.]

Mr. **Perle**. Senator, if I might perhaps help explain, the sensors on board these [deleted].

Senator **Bingaman**. Is this [deleted].

Bob Cooper was testifying to us from DARPA this last week and he said, or I understood him to say—and Dr. DeLauer—that we were not behind the Soviets in the technology and the basic technology does not begin to give us this capability.

Major **Steadman**. In many areas we are perhaps not behind them. In many areas of technology we are ahead of the Soviets, some are close. In areas concerning weapons technology—particle beam weaponry and perhaps certain areas of laser technology—[deleted].

Senator **Bingaman**. Do you know what wave length we are talking about here with this laser?

Major **Steadman**. I do not have the details on this particular item. We can give you that.

Mr. **Perle**. Senator, John Gardner is here from the development side of the house. He may be able to help us with this discussion.

Mr. **Gardner**. Yes. As I am sure you appreciate, we have been looking extensively at this laser technology issue, and at the comparison of the capabilities between ourselves and the Soviet Union. [Deleted.]

Senator **Warner**. To date.

Mr. **Gardner**. Sir?

Senator **Warner**. To date. We are now beginning to [deleted]. Is this type of technology comparable to the Soviets'?

Mr. **Gardner**. Yes, sir. We have included in the strategic defense initiative that we testified before this committee on just a few days ago a much more comprehensive directed-energy weapons program in general, and laser weapon technology in particular to expand our technology greatly compared to what it has been in the past. [Deleted.]

Senator **Bingaman**. [Deleted.]

Mr. **Gardner**. [Deleted.]

Senator **Warner**. One of the difficulties that this committee is experiencing is that we received the testimony with respect to long- and short-range technology in the context of the ABM systems, the Star Wars ballistic missile defense type of testimony, and now this morning we are examining it in the context of antisatellite systems.

Now, of course, there is a correlation that we have got to clarify for the subcommittee, that this technology spreads over both concepts of interdicting ballistic missiles and interdicting satellites.

Mr. **Gardner**. Yes, sir.

Senator **WARNER**. Now to what extent might the Soviets be using this technology in that type of ABM system?

Mr. **GARDNER**. [Deleted.]

Senator **WARNER**. To what extent was this type of testimony shared with the Congress last year? I am not suggesting you are withholding anything, but I am not able to recollect this testimony from last year.

Mr. **GAFFNEY**. Senator, if I may offer, I believe that this committee at any rate did not have a very full hearing on the space threat last year. The year before, as you may recall, a closed session did go into considerable detail on many of these same points. But additional information has become available and I think we have done more work specifically in the ASAT arena looking at what the various Soviet capabilities are, some of which we knew they had, as we will talk about shortly, [deleted].

But I would say that last year, particularly in the context of the floor debate on the Tsongas amendment this committee, at any rate, did not have a very full record on which to inform themselves. I cannot speak for the other committees of Congress.

Senator **WARNER**. Where are we in the Soviet cycle of R&D, testing, operational? Where is this technology in their cycle?

Major **STEADMAN**. [Deleted.]

Senator **WARNER**. [Deleted.]

Major **STEADMAN**. [Deleted.]

Senator **WARNER**. [Deleted.]

Major **STEADMAN**. [Deleted.]

Senator **EXON**. Mr. Chairman, I am very much interested in what they are telling us this morning, and I asked the chairman a few moments ago if he had ever known of this before. He had not.

Did they have that as of yesterday?

Major **STEADMAN**. [Deleted.]

Senator **EXON** To answer my question, [deleted].

Major **STEADMAN**. Yes.

Senator **WARNER**. [Deleted] Mr. Exon.

Major **STEADMAN**. Correct.

Senator **WARNER**. [Deleted], Mr. Exon.

Senator **EXON**. OK. [Deleted.]

Now tell me this without getting into your intelligence-gathering systems that I think should not be brought out here, can you tell us at least in this session how you know all of this? It is pretty highly sensitive information, I would suspect. Has this been obtained by the [deleted].

Mr. **PERLE**. [Deleted.]

Senator **EXON**. Then, Mr. Secretary, are you telling me that you and your agency are convinced that they are as far along on these things as this briefing is leading us to believe?

Mr. **PERLE**. Yes, I believe I indicated, Senator, at the outset that I only recently—that is, in the last few months—became aware myself of both the magnitude and dynamism and effectiveness of the Soviet program. You have not seen me in 3 years on the Hill on this subject, and it was my own discovery of the significance which led me to ask for an opportunity to come up this year.

We have probably been remiss in not conveying it adequately.

Senator **Exon**. Well, thank you, Mr. Secretary. I agree with your statement. That was my next follow-on question. Why have you not told us about this? But at least I am glad you are here telling us about it so that we are advised.

Can you say any more other than what you said—[deleted]. What I am asking you is are you certain of the reliability or has this been projected on the basis of if they might do this?

How certain are you?

Mr. **Perle**. The evidence about their current capability I think is very solid. As you look further into the future with the evolution of those capabilities, obviously like any estimate it becomes a little less certain.

Senator **Exon**. OK. I have been advised that we are going to have a highly classified briefing and get into some of this, and this is probably not the time to pursue it, Mr. Secretary.

Senator **Warner**. But at this juncture, Mr. Secretary, we should, I think, put into the record that at present a law passed last year precludes the United States from conducting the necessary R&D to begin to bring our systems in parallel equivalence with the Soviet systems; is that correct?

Mr. **Perle**. Yes, Senator that is correct. The effect of the amendment proposed by Senator Tsongas, and I think it was a well-meaning amendment, the effect is that in the absence of negotiations—and we are not now negotiating with the Soviets, not the least of all because we do not know how to verify any treaty that might result—in the absence of those negotiations we cannot proceed to develop our own capability.

Senator **Warner**. And we are steadily falling behind, while they are steadily advancing?

Mr. **Perle**. I believe that is correct.

Senator **Bingaman**. Mr. Chairman, am I confused? I cosponsored that amendment, and it did not talk a bit about research and development. It talked about testing. Now am I confused on this subject? We can do all the research and development we want in this area; we just cannot test against a target in space. Is that correct, Mr. Secretary.

Mr. **Perle**. That is correct.

Senator **Bingaman**. So we are not—nothing that Congress has passed in this amendment is impeding our research effort in this field, unless I am confused about it.

Mr. **Perle**. Senator, with respect to our current program, we have taken the research as far as it can be taken, and the next step is the testing. If we cannot proceed with the testing, then we cannot proceed with the program.

Senator **Bingaman**. And under the amendment you have to notify—the President has to certify to Congress that good faith efforts have been made to negotiate an antisatellite weapons agreement, as I understand it, and that it is necessary for the national security that we go ahead with the testing.

Mr. **Perle**. That is correct.

Senator **Bingaman**. And we have received no such certification and, therefore, the testing is not proceeding.

Mr. PERLE. Well, we have not reached the point yet at which the first test that would be enjoined by the amendment would take place.

Senator BINGAMAN. So the amendment has not prohibited anything yet or prevented anything yet?

Mr. PERLE. That is correct.

Senator BINGAMAN. Has this Soviet laser been tested against a target in space? [Deleted.]

Mr. PERLE. [Deleted.] There may be additional information on that point.

Major STEADMAN. [Deleted.]

Senator WARNER. So that really complicates it, if not make impossible verification at this time. If we were to proceed into a series of negotiations on this subject, [deleted].

Major STEADMAN. On the intelligence community committees that I am part of we are discussing this very issue, [deleted].

Senator WARNER. Now, Secretary Perle, my question may well have misled the committee. I said that there was an existing law, namely the Tsongas amendment, that prohibited our program from going forward, but then you got a clarifying statement to the effect that at this time it has not impeded any scheduled test.

What is that timeframe within which this amendment would impede further research? I embrace within "research" a test.

Mr. PERLE. The first test that would be prohibited under the amendment is scheduled to take place in [deleted]. That is a little bit later than originally planned, [deleted].

Senator WARNER. Of course, then we have the option in Congress of either removing that amendment or the President is given a means by which to certify to Congress the necessity in light of national defense considerations to proceed with that test; is that correct?

Mr. PERLE. Well, unhappily, we would have to certify to more than the necessity for national security purposes of proceeding. We would also have to testify, to use the words of the amendment, that "the United States is endeavoring in good faith to negotiate with the Soviet Union a mutual and verifiable ban on antisatellite weapons."

Senator WARNER. And that in fact has not been originated yet?

Mr. PERLE. It is an impossibility, Senator, since we do not know how to verify it and, therefore, we do not know how to negotiate a mutual and verifiable treaty. I believe, if I may say, that had that been understood at the time——

Senator WARNER. By whom?

Mr. PERLE. By Senator Tsongas, he might have approached it a little bit differently.

Senator WARNER. In other words, at the time the amendment came up, my recollection of it is that members of this committee and myself simply did not possess the knowledge to adequately debate this issue on the floor. I was unaware of the impracticality if not impossibility of verification in this whole area of antisatellite systems at the time the amendment came up.

Mr. PERLE. I began by saying that we in the administration have been remiss in failing to brief you adequately.

Senator **Warner**. What is done is done. Now the obligation of this subcommittee and others is to begin to try and establish some equity between the capability of the United States and the Soviet Union to proceed in this area.

Senator **Exon**. Mr. Chairman, could I ask the Secretary a question?

Senator **Warner**. Go ahead.

Senator **Exon**. You know, Mr. Secretary, I listen to all of these things and we people sit here on this side of the Potomac in rooms like this and I do not challenge for a moment the intent of the agency. I think you have done an excellent job. I am delighted you are bringing this to our attention so that we will be much better informed than we were.

When I see these things developing I see the most massive new arms buildup. You know, it is far beyond the MX. It is far beyond the Titans that you and I have discussed and argued about. It is so far beyond all of that that we are talking now about trying to get together on some kind of an agreement with the Soviet Union for old-fashioned ICBM's.

This whole area—would you not agree that this whole area is one of the major threats? If we have to launch on some kind of a program to offset these kinds of things, which we may have to do and which I suspect you think we have to do, I would like to know your philosophy a little bit more.

We obviously should be paying as much attention to trying to get together with the Soviets on these kinds of systems as we are with the ICBM's. Would you agree?

Mr. **Perle**. Well, Senator, subject to two qualifications. One, this is an area in which verification is in general extraordinarily difficult and with respect to some of these technologies I believe impossible. And given the importance of these capabilities I am not prepared, would not be prepared, to enter into an agreement that could not be fully verified and verifiable enough in advance of any possible contingency that would require the use of these systems so that we would be able to respond.

I frankly would have believed that, did believe that, even before our most recent findings of Soviet violations of existing agreements, and that only reinforces the view that we cannot take it on trust.

Second, I feel bound to say——

Senator **Exon**. I did not suggest we take it on trust, and I think that is a given.

Mr. **Perle**. Well, if that is a given, then I believe it follows logically that there is very little potential for arms control in this area. The verification problems are simply insurmountable. I understand your frustration. It is not an appealing prospect that we will have to continue to make levels of investment necessary across the board, not just in the weapons systems but in the intelligence systems, ASAT capabilities and lasers and the like.

But we are, unhappily, faced with an adversary, an adversary with less than half our GNP that is prepared to put enormous resources into these programs. And I believe it is unavoidable that we make the effort to keep up, albeit on a much smaller scale.

If I recall the figure, the Soviets, we believe, are spending roughly $22 billion a year on the exploitation in space, and their's is a fundamentally military-oriented program. We are spending far less, with a very heavy emphasis on civilian applications of space. And over time the aggregate gap in investment between us and them has grown large and will continue to grow larger, and it is going to produce facilities for which we have nothing comparable.

It is going to produce capabilities that we cannot match.

Senator **Exon**. Let me get into a very practical question that I think you will not want to answer, but it comes to my mind as one who has to make some important decisions, and I try to make them in the best interests of the United States. We all do.

Let us assume that you had a choice of putting $15 to $50 billion in the next 10 years into what you have outlined here, which seems very serious to me, and abandoning and cutting out the MX program. You know, if you had a choice of one or the other, which do you think is the more critical as far as the future is concerned? I say that because I know you have had a lot of background and experience and I suspect that would be a very difficult question for you to answer, because you will say we need both, I am sure.

But given one or the other, which do you think is the more serious threat in the next 10 to 15 years?

Mr. **Perle**. Well, in a sense they are not really comparable because we are talking about a variety of programs on the Soviet side that are of concern to us, and a variety of American responses which I think do not equal in cost the MX.

For example, the limited ASAT capability that we are now seeking over the next decade or so will cost approximately $4 billion or $400 million a year. I think we need to invest more in the protection of our own satellites. We have to recognize the threat and do more to provide them with passive and possibly even active defenses.

When you add that up, I think given the capability of our technological community we can give them a pretty good run for their money even with smaller budgets. But we cannot do it if we encumber ourselves with policy declarations that simply inhibit our responses. It is not even a question of money and that is why I feel very strongly that the approach of the Tsongas amendment is a misdirected one

It says you must pursue—that we cannot respond to the Soviet program except in the context of an arms control negotiation.

Senator **Warner**. I think we have to get into that. Now Senator Nunn was here. He was anxious to ask some questions in closed session. We have a procedure here and I welcome the participation of the members in resolving it.

ASAT PROGRAM

The chairman this morning at the convening of the subcommittee counseled with the Secretary and it was our view that we should endeavor at this time to get some record in the public domain with respect to the disparity between the U.S. ASAT program and the Soviet ASAT program.

We, therefore, gave notice to the press that this hearing would go open at 10 a.m. for a period of time to develop some public record, recognizing we could supplement that public record through questions and additional testimony in writing from the Department of Defense in days to come, and then we will go back into closed session to receive more testimony from Secretary Perle.

We now have that window available and I would like to have your views on the mutual convenience of the Members present to go into an open session at this time, understanding we will then return to closed session later.

Mr. Bingaman?

Senator **Bingaman**. Mr. Chairman, I am glad to do it in any order you would like. I do think I would like to get some indication from you or from the Secretary as to what subjects can be discussed in the open session. It strikes me that we have what for me is a major revelation here in this closed session, which is that some of us in the Congress have been urging an attempt at arms control with regard to antisatellite weapons and what I am hearing the Secretary say is that these things are, some of them at least, absolutely unverifiable and, therefore, arms control with regard to antisatellite weapons and other types of space weaponry is not feasible.

And that is a major difference between what I am now hearing and what I have understood before. So that is something I think I would obviously like to pursue further, and I do not care whether it is open or closed session or whatever, but I would like to know whether the Secretary is in a position to discuss his views on that in an open session. If so, I would like to, obviously, question him about it.

Senator **Warner**. Yesterday I asked that very question of the Secretary in open session, and it was at that time I conceived the idea that we had better begin to get this in the open and he responded to it. So to some extent he is prepared this morning to make responses to that type of inquiry.

What I am trying to do is establish something to build a public record. We have got to address this question.

Senator Quayle?

Senator **Quayle**. Certainly I support what you are trying to do on attempting to get as much information as possible out for the public record. We are going to have to debate this at some time on the floor of the Senate again. I think the vote was almost unanimous on the Tsongas amendment, but there was very little debate.

This issue is obviously going to come up, so I think what you can do to get as much information out as possible is good and I hope we can have the support of the Secretary and others to declassify as much information as possible because it really would be helpful.

I have two related questions. I want to know if you can answer them in open session or closed session. I want to get into the exact vulnerability of our satellites and also I would like to talk about the SDI and getting the missiles at the boost phase and also the problem of the "man in the loop." Can we go into that in open session?

Senator **Warner**. We are going to have to feel our way and allow the judgment of the Secretary to guide the committee at this time.

Now, gentlemen, we have a practical problem. I think it is important that if only for 15 minutes we go into an open session to create a record which thereafter will become a vehicle that we can begin to take to the Senate floor, and that vehicle can be enlarged as we go along in our hearing schedule.

Senator **Exon**. Mr. Secretary, just let me say that some of the questions that we will ask in open session are not to put anybody on the spot. I do not think there is anything wrong and I think the public can be somewhat informed by the fact that the Secretary said he could not answer that question. When we start talking about taking this to the floor, I have the same concern as Senator Quayle has. There are some things like this that we just have to put through the Congress without going into too much public debate, it seems to me, any more than we have to in an open society.

We have done that before in other matters, and we should do it again.

Senator **Warner**. It may well be that Senator Tower and Senator Nunn might reach the conclusion that an executive session of the Senate is required for adequate consideration. It is presumptuous of me at this time to say that that would be necessary, but that is an option that is open.

I do have a strong belief that we have to have some record started in public. We did that yesterday. Essentially you can replow some of the ground.

Now, Senator Nunn, if you would like at this time, because of your schedule, to ask a question or two?

Senator **Nunn**. Mr. Chairman, there was something that came up yesterday in the Subcommittee on Sea Power and Force Projection that I had a question about and I do not know what the clearances are on this. I would suggest that before I ask my question we have the room cleared of everyone who was not entitled to be in that hearing of the Sea Power Subcommittee, because this is a cross current, and I am not sure in the executive branch who knows what in this area. I know that was a top secret hearing.

Senator **Warner**. First let us ascertain, it is a top secret dialog that you wish to engage the Secretary in?

Senator **Nunn**. Yes, it is a very sensitive area but right on this point.

Senator **Warner**. And I am informed by counsel for the committee that everyone present does have the adequate clearances.

Senator **Nunn**. Is the same thing the case with the executive people?

Mr. Perle, I am almost afraid to ask you a question since the last one I asked you in open session the UPI quoted me as saying what you had said in your statement which I was questioning you about. [Laughter.]

There are some things I want to be on your right and some on your left, but I want it to be my choosing and not UPI's.

Mr. **Perle**. I have the same problem.

Senator **Nunn**. Your testimony says: "A U.S. antisatellite weapon is needed [deleted]."

There you are talking about existing satellites, is that right?

Mr. **Perle**. That is correct, and expected future satellites.

Senator NUNN. [Deleted.]

Mr. PERLE. Yes, that is correct.

Senator NUNN. [Deleted.]

Mr. PERLE. [Deleted.]

Senator NUNN. What is not very durable?

Mr. PERLE. [Deleted.]

Senator NUNN. [Deleted.]

Mr. PERLE. [Deleted.]

Senator NUNN. Well, I am inclined to agree with you about the Navy's approach to not just this but a lot of other things. I mean, they do not see a tactical nuclear threat or a cruise missile threat. They do not see anything. All they want to do is get out there and be invulnerable running all over the world and invading the Soviet Union with aircraft carriers.

Senator WARNER. Were those carriers made in Virginia? [Laughter.]

Senator NUNN. Mr. Chairman, I think they are and, therefore, you should be concerned.

Senator WARNER. Mr. Secretary, back in response to this question from Senator Nunn, [deleted].

Mr. PERLE. That is correct, And I said yesterday in closed session in response to a question that I think we are [deleted].

Senator NUNN. We do not have any conscious, intentional mechanism like that, right?

Mr. PERLE. [Deleted.]

Senator WARNER. Are the Senators agreeable now that we will have an open session? We, on the recommendation of the Chair and other members of the committee will have another session to begin to try to develop a public record.

Senator NUNN. Mr. Chairman, may I close this out with one other very brief question?

Senator WARNER. Yes.

Senator NUNN. So what I am to understand is that you have heard the Navy's argument. You are very familiar with what they are talking about. You know their present capabilities. You know the Soviet capabilities. You are looking to the future and notwithstanding that present Navy feeling of confidence you still believe after taking that into account, we need to go forward?

Mr. PERLE. I do, and I think there is division within the Navy, Senator, on this issue.

Senator WARNER. Will counsel for the committee and other staff clear the room so we can proceed into open session with the understanding we will go back into closed session, hopefully by 11 a.m.?

[Whereupon, at 10:26 a.m., the subcommittee recessed, to reconvene immediately in open session.]

OPEN SESSION

Senator WARNER. The subcommittee will now move into open session for a period hopefully not to exceed 30 minutes. We will ask Secretary Perle to provide testimony with respect to the relative status of the U.S. program relating to antisatellite systems and the Soviet program and the need for the Congress to focus on a reevaluation of the present legislative status, namely the Tsongas amendment.

Secretary Perle, we will allow you to address the subcommittee with your thoughts and then we will go into a period of questions.

I think it is imperative—and I think this view is shared by members of the subcommittee—that we begin to develop a public record on this very vital aspect of our national defense program.

STATEMENT OF HON. RICHARD PERLE, ASSISTANT SECRETARY OF DEFENSE (INTERNATIONAL SECURITY POLICY)

Mr. **Perle**. Thank you, Mr. Chairman.

As you know, I had planned to address these issues in closed session, and so I apologize for testimony that would necessarily be a bit disjointed.

Senator **Warner**. We understand. The subcommittee has been in session now since 9 a.m. and we will then go back into executive session at 11 a.m. But again it was the consensus of the Chair and the membership that it was imperative to begin to provide a public record on this critical aspect of our defense program.

Mr. **Perle**. Let me make a few general points, then, if I may. The first and most obvious is that contrary to the impression that one frequently receives there is already military activity in space, extensive military activity in space, and this includes the existence of an operational antisatellite capability possessed not by the United States or its allies but by the Soviet Union alone—a system that has been tested over many years and we believe is deployed and operational, and for which there is even potential expansion.

We believe this Soviet antisatellite capability is effective against critical U.S. satellites in relatively low orbit, that in wartime we would have to face the possibility, indeed the likelihood, that critical assets of the United States would be destroyed by Soviet antisatellite systems.

Moreover, the Soviets have underway a vigorous program of research and development aimed at achieving still other antisatellite capabilities.

Senator **Warner**. And that program embraces active testing?

Mr. **Perle**. That program embraces active testing and, unhappily, much of the technology entailed in some of the approaches that the Soviets are pursuing is extraordinarily difficult to verify.

Senator **Warner**. If not impossible?

Mr. **Perle**. If not impossible.

We do know that the level of Soviet activity with respect to space is considerably larger than our own and the essential orientation of the Soviet program is military, whereas our smaller program is essentially oriented toward peaceful uses and civilian uses in space, although we, too, do have a program of research and development with respect to military uses of space. If, in wartime, the Soviet Union were to attack critical satellites upon which our knowledge of the unfolding conventional war depended, in the absence of an American antisatellite capability I think it is evident that we would have little choice but to escalate in order to deter continuing attacks on our eyes and ears, without which we could not hope to prosecute successfully a conventional war.

We would not do very well in a conventional war even if we had conventional armament comparable to that of the Soviets, but as this committee well knows, the Soviets have an overwhelming superiority in almost every category of conventional weapons, particularly as those weapons affect the security of the NATO alliance.

So I submit that in order to deter Soviet use of an antisatellite weapon, which we know they possess, it is in the interest of the United States to be able in wartime to respond in kind, if necessary. The Soviets are aware of our ability to respond and having assets in space of their own that they wish to protect might well be deterred from launching an initial attack against our satellite capabilities.

But there is yet another reason and in some ways a more important reason for proceeding with an antisatellite capability of our own, and that is that the Soviets have vital intelligence collection systems in space that in a conventional war could well spell the difference between the ability of this country to carry out its NATO obligations and our inability to do so.

If I may be a little bit more specific, the Soviet now have in orbit reconnaissance satellites, ocean reconnaissance satellites.

Now when one considers that in the last world war at the height of the Nazi U-Boat assault in the battle of the Atlantic the German navy had 20 percent of the number of submarines that the Soviet navy now possesses, I think it is clear that maintaining the sea lines of communication between the United States and its NATO Allies in wartime depends vitally on our ability, if necessary, to neutralize satellites that will disclose the location of our fleet and merchantmen, because if one can localize those naval assets the destruction of them is not difficult.

So I believe that even if the Soviets did not have an ASAT capability we would require one in the event that we find ourselves in a conventional war suffering unacceptable attrition as a consequence of the sanctuary that the Soviets would regard their intelligence collection assets in space.

Now as this committee knows, the Congress last year passed an amendment offered by Senator Tsongas that imposes conditions upon the continuation of the fledgling ASAT program that the United States now has in development. It requires that before we can proceed with the testing of our own ASAT system against an object in space that the President must certify to two things.

He must certify first that the administration is endeavoring in good faith to negotiate a mutural and verifiable ban on antisatellite weapons.

Senator WARNER. And you interpret that as being negotiations should be in session?

Mr. PERLE. Negotiations should be in session. There was some discussion on the floor as to precisely what that meant, and at one stage Senator Tsongas said:

> This language is intended simply to require certification by the President attesting to the fact that the U.S. Government is actively assessing the possibility of negotiating on issues with the Soviet Union of a verifiable, effective ban on satellite weaponry and is willing to negotiate such a ban with the Soviet Union.

Moreover the President would have to certify to the importance for national security of preceeding with the program. The dilemma flows directly from the conclusion that we have reached that we are unable——

Senator **Warner**. "We," meaning the Department of Defense?

Mr. **Perle**. We, the Department of Defense, are simply unable to identify a means by which we would verify a ban on antisatellite weapons. The more comprehensive the ban, the more difficult verification becomes.

There is a tendency to talk about verification being difficult or extremely difficult, when in fact we often mean—and I believe should say—impossible. The reason why it is so difficult to verify a ban on antisatellite weapons is that the activity associated with the launching of satellites is virtually identical to the activity associated with the launching of antisatellites.

Senator **Warner**. The first classification of satellites might be perfectly peaceful ones—weather satellites, navigation satellites. So the activities associated with the launching, maintaining, operating of peaceful satellites is concurrent with that required for weaponry and antisatellites.

Mr. **Perle**. That is correct. The same launch vehicles, the same launching pads, the same support facilities are entailed in both launching satellites and in launching antisatellites, and it is awfully late in wartime to discover that what you thought was a satellite launching system turns out to be an antisatellite launching system.

So we do not know how to verify it. And when one gets to other technologies—laser technologies, for example—that would be aimed less at the destruction of satellites than at the destruction of instrumentation aboard those satellites——

Senator **Warner**. Which is just as effective as destroying the satellite.

Mr. **Perle**. Absolutely. It is the efficient and economical way to do it. Here verifying research and development becomes all but impossible. So we face a dilemma that is inherent in the terms of the legislation by which we are now bound. The legislation requires that we made a good faith effort to do something that we believe it is impossible to do.

Let me say that this is not only the conclusion of this administration, that the previous administration worked long and hard on the study of the verifiability of an antisatellite ban, produced a lengthy report—it must be an inch thick—looked at 20 or 21 or 22 different possible approaches to ASAT arms control, and came to the conclusion that the verification problems were insurmountable.

I share that view, Senator, and I think we need to face up to the implications of the legislative injunction that now prevents us from proceeding with a test of our own system.

DETERRING WAR ON EARTH

Now I have a further concern. The President is asked under the Tsongas amendment to certify to our willingness to enter into a ban on antisatellite weapons, and it is my view that we would be unwise to enter into such a ban even if we knew how to verify it for the reasons that I stated previously.

That is, to make a sanctuary of space in a manner that may make it possible for us to be defeated on Earth in a conventional conflict with the North Atlantic Alliance at stake seems to me to reverse sensible priorities. Our first priority must be the deterrence of war on Earth. It is only of secondary importance whether there are or are not military capabilities in space which in fact we already have in various forms.

So I would very much hope that we would not certify a willingness to do something that reverses our fundamental priorities.

Senator **Warner**. Let me clarify your last point. You are suggesting, I believe, that if we were to freeze, so to speak, the relative capabilities of the Soviet Union and the United States as of today through some type of ban or proposal, that would put us in a conventional scenario at such a disadvantage that it raises the level of necessity for at some point resorting to nuclear weaponry on our side to offset this advantage?

Mr. **Perle**. At least resorting to escalation of the conflict. The point is sometimes made, for example, that we could in the event that we felt menaced by Soviet ASAT capabilities attack the launch facilities from which those Soviet antisatellite weapons would be launched, and indeed we could if we were prepared to launch an attack against facilities in the Soviet homeland—probably using ballistic missiles and probably nuclear ballistic missiles.

But if what we were engaged in was a war in Europe, a conventional war in Europe, I believe it would be very much in the interests of the United States and our allies and, indeed, the world that we try to win that war conventionally and not escalate simply because we did not have a conventional capability that we were capable of developing.

ANTISATELLITE WEAPON SYSTEM

I would point out that the antisatellite weapon system that we presently have under development is a conventional system. It does not utilize nuclear weapons. It seems to me that wherever we can reduce the emphasis on nuclear forces we should. We ought to avoid situations where we create a necessity to turn to nuclear weapons because we do not have a conventional alternative.

Senator **Warner**. A quick summary then. At the present time it is your testimony that the Soviet Union is far advanced in the area of antisatellite technology, that the present law is an impediment to the United States in trying to initiate programs to achieve parity or equivalence, and, second, there is a subquestion in here—if not equally important.

Given the opportunity to enter negotiations on antisatellite weapons in the area of arms control, it may indeed be impossible to have adequate verification provisions in such an arms control proposal?

Mr. **Perle**. Yes, Senator. And while one could go through the motions of such a negotiation, I think there are occasions when we have to be candid with ourselves and recognize the unhappy realities of the situation are such that we can see no successful outcome because of the verification problem.

Senator **Warner**. And that would be reciprocal. The Soviets likewise would recognize the inability to have an adequate verification provision, because our assets, peaceful and military, could be comingled very easily.

Mr. **Perle**. That is correct, although the Soviets have one enormous advantage in this regard, and that is we are a country governed by law, and when we sign treaties they have the status of law, and the number of people who would have to conspire to violate the law, to violate a treaty obligation, is sufficiently large so that the Soviets could be confident that we could not do it.

And I believe we would not do it. But even if we desired to do so, there would be hundreds and perhaps thousands of people involved in the deliberate and overt violation of an international treaty obligation. So the Soviets can rest quite confident that in this open society we would be unable to violate our obligations, whereas they are not only free to violate theirs, they are in the process of doing it even as we speak.

Senator **Warner**. Senator Bingaman?

Senator **Bingaman**. Thank you, Mr. Chairman.

Let me just clarify—and I hate to make you repeat, but I think this is a very important point you are making—your first point is that arms control with regard to space weaponry, antisatellite in particular, but I gather that most of what you say applies generally at least to directed energy weaponry—the lasers and that sort of thing—that arms control with regard to that is not verifiable and, therefore, is not feasible in the view of this administration.

Is that an overstatement or too much of a simplification?

Mr. **Perle**. Well, I would like to confine the categoric statement that I believe a ban on antisatellite weapons is unverifiable to antisatellite weapons. Beyond that, there are other military activities in space that pose varying degrees of verification problems. So I do not want to overgeneralize.

With respect to the development of an antisatellite capability, I believe a ban would leave us unable to verify Soviet compliance.

Senator **Bingaman**. So it is the position of the administration that——

Senator **Warner**. On that point, I wonder if I might ask as whether, in fact, the testimony you are giving this morning is the agreed-upon position of the administration.

Mr. **Perle**. I was about to come to that if I had to. I guess I will have to.

Senator **Bingaman**. I appreciate it. I assumed you were speaking for the administration. Is that wrong?

Mr. **Perle**. The administration at the moment is preparing to send to the Congress a report required by law laying out a comprehensive approach on this whole subject. I rather doubt that the administration will find something that we in the Department of Defense and the intelligence community would believe unverifiable is verifiable, but the question of what position the administration will take on how to proceed is still under discussion.

TSONGAS AMENDMENT

Senator **Bingaman**. OK. But let me then just ask another clarifying question on it.

Those of us who cosponsored or tried to help Senator Tsongas with his amendment last year, which requires that the President hold off or that the administration hold off the testing of our antisatellite weapons until the President can indicate that we have endeavored in good faith to negotiate with the Soviet Union, I, for one, at least was under the impression that that was a feasible goal—to actually negotiate with the Soviet Union on a ban on antisatellite weaponry.

And you are telling us that is not a feasible goal and, therefore, not one that you believe can be pursued in any realistic fashion.

Mr. **Perle**. That is correct.

Senator **Bingaman**. OK. The other point that I understood you to make is that even if that were verifiable and were a feasible goal to have a ban—a mutual, verifiable ban—on antisatellite weapons, is it your position—I gather the Defense Department position—that that would not be a wise course to pursue, that to do so, I think your language was, would create or would permit the creation of a sanctuary in space that would make it possible for us to be defeated here on Earth, and, therefore, it would be unwise for us to do it even if we could.

Is that right?

Mr. **Perle**. That is my view. I would not attribute that view either to the Department of Defense or the administration simply because the issue is an intellectual one and has not really come up, since we think that the basis for concern in the first instance is verification, and that is decisive by itself.

My own view beyond that, Senator, is that we would be taking an undue risk if we were to find ourselves in a conventional war unable to strike satellites that might be essential to the destruction of our sea lines of communication.

Senator **Bingaman**. Is it fair to generalize a little bit from your first conclusion that we have gone over and say that there is great skepticism on your part that we will be able to use arms control effectively to control any or to restrict the development of any of our directed energy weapons in the future? Is that a fair generalization?

Mr. **Perle**. I believe there the verification problems are extraordinarily difficult and the lead times are relatively long. As you know, we have been living since 1972, since May 26, 1972, under a treaty prohibiting ABM systems. In the 12 years that that treaty has been in existence, the Soviets have enormously increased their investment in research and development on ABM, including precisely these areas of directed energy and laser devices and the like to the point where I now believe that in significant categories they are ahead of the United States.

So I believe that the intent of that treaty, which was to eliminate then and forever the development of strategic defenses, has probably had the effect of permitting the Soviets to gain a significant technical advantage in the strategic defense area.

Senator BINGAMAN. So I guess it is fair to conclude that in your view there is really no alternative to going forward full speed with development of directed energy, laser weaponry because traditional concepts of arms control which we have at least tried to use to restrict the development of other types of weapons are not going to be applicable in this area to any significant degree.

Mr. PERLE. I would only take issue with the adjective describing the program. It is a measured program that recognizes some budget realities. But I think the history of arms control with respect to the inhibition of technical innovation has been a pretty sad history.

It has always been symbolized for me by the two agreements signed at The Hague in 1899 and 1905. In 1899 at the first Hague Conference the great powers agreed to ban the dropping of projectiles from balloons, and by 1905, the beginning of the doctrine of air power, the same great powers meeting deleted that provision because no one was prepared to take the risk that the other fellow might not develop a projectile that could be dropped from a balloon with greater effectiveness than he could do it.

Arms control as a means of inhibiting technology seems to me almost certain to fail, and that is especially true when the agreements are negotiated between an open society and a closed society, because everything we do is subject to any agreement we may reach, whereas we are unable to peer into Soviet laboratories and can have no confidence that they are abiding by the rules.

Senator WARNER. Mr. Secretary, Senator Bingaman, I do feel under the allocation of time Senator Quayle should have an opportunity.

Senator QUAYLE. Thank you, Mr. Chairman.

Mr. Secretary, I certainly agree with you as far as the context of arms control, that we should not let it be utilized to inhibit any kind of technological advancement. You have stated rather conclusively that in the antisatellite warfare area, that the Soviet Union is obviously ahead of us.

They have that capabilty and I suppose that even if in fact you never get to the negotiation table in that particular area you get into some sort of a tradeoff. We certainly are not there yet. Is that a fair assessment to say?

Mr. PERLE. Yes, I think that is correct.

Senator QUAYLE. Now, on comprehensive verification you have basically said that it is not possible with current technology. Are you ruling out future technologies?

Mr. PERLE. Well, I would not want to rule out what is inherently unknowable, but we cannot now foresee means of verification, and that may be a perfectly valid reason for not closing the door now and forever to negotiations in this area. If developments permit reason to believe we might verify an agreement, then we will continue to monitor the potential for verification.

There is no desire on the part of the administration to close the book on this issue and stop thinking about it, but as of now we simply do not know how to do it.

Senator WARNER. Will the Senator yield? Now that is the technological means of verification. Of course, if we swung into the area of intrusive onsite type verification it might well lend itself to some option.

Mr. **Perle**. It might, although there, too, I think we would have great difficulty again precisely because the differences between launching a satellite and launching an antisatellite are so minimal. For all we know, Senator Warner, there are antisatellite weapons in space today.

Senator **Warner**. In other words, we do not know whether they are up there today.

Mr. **Perle**. There are satellites in space that may have an ASAT capability and we cannot establish that.

Senator **Exon**. Some of them are lost up there and we do not know where they are.

Senator **Quayle**. Do you think that there are now antisatellite weapons up there? I mean, you sort of teased us with it. You obviously must think that there are.

Mr. **Perle**. Well, we cannot rule it out. That is the point. I do not have a judgment one way or the other, but let me say that if we had an ineffective arms control regime—that is, if we entered into an arms control agreement with scant hope of adequate verification—we could well encourage putting objects in space that would have an ASAT capability that we would not know about because agreements can encourage cheating, and they have in the past.

Senator **Quayle**. I think it is prudent to indicate that as we go down this road that if verification becomes a possibility or that there is always a potential for some sort of an arms control situation at some later juncture, I think we should not rule that out. And I detect from your statement that you are not ruling out that possibility.

Mr. **Perle**. No, we would not rule it out.

Senator **Quayle**. I have one concern. Maybe you can amplify on this. You have described the antisatellite capability of the Soviet Union today. You say in a wartime situation that if they are able to knock those things down then it lowers the nuclear threshold. How vulnerable are those satellites?

Detecting from your assessment, they strike me as being exceedingly vulnerable. Is that the case? Beyond just building some antisatellite capability, should we not be doing something more to make them less vulnerable?

Mr. **Perle**. I believe we should indeed be doing more to protect our capabilities. The difficulty is that satellites are delicate instruments, of necessity. Building satellites that could resist the explosive force of even the current generation of Soviet antisatellite weapons would be extraordinarily difficult technically. The weights involved would be enormous.

SATELLITE VULNERABILITY

The sensors on satellites themselves are extremely delicate, so there is really not a lot we can do with respect to some satellites. Now making satellites movable so that if they are under attack they can be relocated in another orbit, there are things that can be done of a protective nature, and I believe we should be doing more of that.

Senator **Quayle**. But right now with present capability or, say, in the next 3 to 5 years the capability of the Soviets in antisatellite warfare, these satellites up there of all modes are going to be exceedingly vulnerable; is that correct?

Mr. **Perle**. Some of them will be exceedingly vulnerable, and I find it interesting that one of the arguments that has been invoked against proceeding with an American system is the idea that the Soviets are only capable of destroying a quarter of the U.S. satellites.

We are capable of destroying no Soviet satellites, but the quarter in question happen to be very important satellites, and we would very much like to deter a Soviet attack on those satellites.

Senator **Quayle**. The vulnerability of those satellites, what does that say about strategy for us in the strategic defense initiative, that we are going to get them in a multilayer type situation as soon as possible? What does that say about that capability?

Mr. **Perle**. Well, I cannot give you a technical answer to that, except to observe that the destruction of launchers in the boost phase with weapons based in space would entail, I should think, a capability also to destroy satellites in space. That is, a system with sufficient power to destroy ICBM's could easily attack satellites.

Senator **Quayle**. In other words, it would have the capability of defending itself against antisatellite weapons; is that what you are saying?

Mr. **Perle**. It would defend itself by destroying boosters launched against them.

Senator **Quayle**. But if they are vulnerable as far as the utilization of it, if they are really that vulnerable—they are a very integral part in this whole thing.

Mr. **Perle**. Well, remember how the Soviet ASAT system works. They identify a target in space and they launch a booster at that target. Now a comprehensive defense system based in space would intercept that booster just as it would intercept a booster carrying a reentry vehicle.

Senator **Quayle**. So it would have the capability to defend itself?

Mr. **Perle**. It would have a generic capability.

Senator **Quayle**. Thank you, Mr. Chairman.

Senator **Warner**. Senator Exon?

Senator **Exon**. Thank you, Mr. Chairman.

As I said in closed session, I appreciate your being here, Mr. Secretary, very much, and the information you have given us is very helpful. Maybe just two questions.

TREATY VIOLATIONS

In your view, are there any violations of any treaties or agreements either by the Soviet Union or by what we are doing in R&D in this area?

Mr. **Perle**. I can speak certainly for the United States. We have not violated and have been scrupulous in adhering to the obligations we undertook in the 1972 agreement. I believe that there have been several violations by the Soviet Union of the ABM Treaty, the most consequential of which is the construction of a radar at Krasnoyarsk in clear violation of the terms of the treaty.

Senator EXON. Now we have been through that. I am asking specifically about the capability that the Soviets have which you testified to in both open and closed session. Is that in your opinion a violation of any treaty arrangement or agreement?

Mr. PERLE. I am sorry. I misunderstood the question. There is no treaty that would limit the buildup of an ASAT capability.

Senator EXON. I thought that was the answer that I was seeking. Now given that, it seems to me that we are talking here about a tremendously scary, really scary escalation of the arms race in both sides seeking the ultimate in offensive or defensive weapons. Given that, I suspect that if we are doing enough in this area along the lines that you think we should be doing, possibly even the administration's defense budget in the next 5 years may be understated. Do you believe that in the President's budget recommendations for the next 5 years that sufficient resources have been devoted to correcting whatever deficiencies we have in this particular area?

Or do you think that they might be understated and we will probably have to spend more?

Mr. PERLE. No. I believe, Senator, that the U.S. ASAT program, which is a $4 billion program over 10 years or so, is an affordable and sufficient response. I think we probably need to do more than we are now doing to protect our satellites, and I would expect to see an increased investment in that, but not one that would have serious budgetary consequences.

I would not use the phrase "escalation of the arms race" because it is a bit daunting and what I think really is involved here is a measured response to some specific problems that have developed to the Soviet capability to which we would like to make a response.

Senator EXON. And you are telling the committee this morning, in both open and closed sessions that you would be satisfied with just spending $4 billion that was outlined in the President's budget? Do you think that that will meet this threat?

Mr. PERLE. That will give us a limited antisatellite capability comparable to the capability the Soviets now possess. We would very much hope that with such a capability we could deter an intial Soviet use of their ASAT capability against our satellites, and in situations where the outcome of the conventional war might depend on the neutralization of Soviet satellites we would have that option as well.

And I think that is an adequate response. I do not envision, concerned as I think we must be at the moment over the Soviet research and development program with respect to space, I do not think we need to overrespond, and I think the current program is adequate.

Senator EXON. I took it from your last statement that you did not think this was a signficant acceleration of the arms race. It seems to me it is just the opposite.

You know, I am not arguing whether it is necessary or not. I am talking about given the facts that you have given us I would have to conclude that it is a major escalation, expansion of the arms race, and I would suggest that $4 billion would be a very minimum "downpayment," as it is used these days, with regard to the budget. I would suspect that would be a very minimum downpayment on what this could lead to unless there can be some verifiable arrangements and agreements between the Soviet Union and the United States to stop it.

Mr. PERLE. Senator, we have been spending rather less on strategic forces during the dozen years or so that we have been bound by agreements affecting strategic forces. The Soviets have been spending rather more than they did in the period before they were bound by agreements.

So I respectfully question whether we can minimize the burdens on ourselves through agreements of the kind you have in mind. The Soviets have added 75 percent to the number of strategic nuclear warheads capable of striking the United States since the SALT II Treaty was signed, and the growth of Soviet forces since the SALT I Treaty was signed presents an enormous problem for our security.

So the treaties in the past have not worked to minimize the burdens of maintaining a deterrent and I frankly cannot see how an unverifiable treaty affecting antisatellite weapons would make it easier for us to cope with the problem of deterring the Soviet use of those weapons.

NONNUCLEAR WEAPONS

I would only make one other point, and I think it is important to remember—about nonnuclear weapons. The U.S. program, like the Soviet program, is a nonnuclear capability and I think the time has long since past when we should be looking for ways to improve our defenses in a conventional sense, minimizing reliance on nuclear weapons.

Any nuclear ICBM can be used as an ASAT, so the destruction of satellites with nuclear weapons is child's play. I think it is worth the investment to obtain a minimal capability with conventional.

Senator EXON. I hope you are right, Mr. Secretary. It just seems to me that history has shown us one thing, and it has shown it very clearly. When we start out with weapons systems in the "conventional" area, they usually escalate into nuclear devices, whether it is for battlefield or strategic use, and I suspect the same general trend will probably follow in space.

I am very much concerned about it and I appreciate your testimony. Thank you.

Senator WARNER. Now, gentlemen, I would like to ask one more question, but I would defer to you if you have additional questions.

Senator BINGAMAN. I have one more.

Senator WARNER. Mr. Secretary, as I have sat here these past few weeks and received testimony on a variety of aspects of the strategic relationship between the Soviet Union and the United States and the areas in which the President and indeed this Nation still hold out hope to achieve some measure of arms control—recognizing, of course, we are not at the table today, but we predicate our actions on the hopes of the future, that we can return to the arms control negotiating table—here is the question I put to you.

Senator Exon and I were talking and were trying to compare the testimony last year with this year. We are now beginning to see in this area of ASAT, because of the technology, because of the interchangeability of the civilian use of satellites and military use of satellites, you said an impossible area for verification, which brings me to this question.

The old adage a chain is no stronger than its weakest link. We have now discovered a link in this chain of ams control agreements that is virtually impossible to negotiate.

What is left with respect to the other links, namely pursuing arms control in INF, pursuing arms control in ICBM's, and in other areas? If there is one area of technology, one area of warfare, which is beyond the reach of the best intentions of the most well-intentioned negotiators on both sides in arms control, what remains of the other?

FINDING VERIFIABLE APPROACHES TO ARMS CONTROL

Mr. PERLE. Well, I think in the other areas we have far better prospects for adequate verification. I think we have to press ahead in those areas where we can have reasonable confidence that agreements will be complied with and compliance can be verified.

So I think you are quite right in pointing out that this is one rather narrow segment where the similarity of civilian-permitted activity and military-banned activity is so close that it makes it impossible to verify.

But in other areas where programs are distinctively and uniquely military we have considerable hope, if the Soviets would return to the table, that we can find verifiable approaches to arms control.

Senator WARNER. But assuming we are unable to reconcile this "impossible" area of verification, how can we in good faith go to the American people and say well, perhaps we can negotiate an ICBM or an INF Treaty? Again, the verification of those treaties is finally dependent on certain satellite systems which are in fact totally vulnerable.

Mr. PERLE. I think we would have to say that we can only verify compliance in peacetime and that if the Soviets were to choose to destroy our satellites our ability to verify their continuing compliance would be greatly diminished, and in fact the Soviets are already even now interfering, in a number of ways that we believe violate their arms control commitments with our national technical means of verification.

The case you cite is the extreme case where they actually attack the national means of verification. So there is a fragility, an unavoidable fragility, in any arms control agreement that only works in peacetime.

Senator WARNER. Senator Bingaman?

ANTISATELLITE WEAPONRY

Senator BINGAMAN. Thank you, Mr. Chairman.

Let me just clarify your conclusion that a treaty with regard to antisatellite weaponry or capability is virtually impossible to arrive at and probably unwise to arrive at if it were possible. Does that apply to both the low orbit satellites and geosynchronous satellites—I mean, the whole range of satellites that we are presently able to use?

Mr. **Perle**. I believe it does, Senator, not the least of all because an ICBM with a nuclear warhead can be launched at even geosynchronous satellites with a very high prospect of destroying them.

Senator **Bingaman**. In your statement just a minute ago that this is a very narrow band of activity which is not subject to verification, my understanding is that most of what you are saying is equally applicable to any type of high energy laser, directed energy weaponry.

The problems of verification that you point out with regard to antisatellite weapons is equally applicable to this whole range of weaponry that now is coming on the scene, so that it is not a narrow band of activity we are talking about here not being subject to arms control; it is a tremendously large band of activity.

Mr. **Perle**. Here I think it is important to draw the distinction between verifying research and development activity and possibly some installations with some capability to hit satellites on the one hand and something like strategic defense on the other which would entail in the latter case quite sizable installations in space, perhaps on the earth, and supporting facilities and the like.

And there the prospects for verification would be a good deal better. I think we could detect the Soviet deployment of an ABM system in space, for example. Research and development of components that might get you there poses a different set of problems. The deployment of an ABM system I think we have reasonable confidence.

Senator **Bingaman**. Thank you, Mr. Chairman.

Senator **Warner**. Senator Quayle, anything further?

Senator **Quayle**. No, Mr. Chairman.

Senator **Warner**. Senator Exon, anything further?

Senator **Exon**. No, Mr. Chairman.

Senator **Warner**. We will now go into executive session.

[Whereupon, at 11:20 a.m., the hearing recessed, to reconvene immediately in executive session.]

EXECUTIVE SESSION

Senator **Warner**. Mr. Perle?

Mr. **Perle**. Mr. Chairman, on the intelligence presentation, we were about halfway through.

Senator **Warner**. I think it is wise that we resume.

Major **Steadman**. We have just completed a discussion of the [deleted].

Senator **Warner**. What is the energy that is used here?

Major **Steadman**. [Deleted.]

Senator **Warner**. [Deleted.]

Major **Steadman**. That is correct. [Deleted.]

Senator **Warner**. [Deleted.]

Major **Steadman**. [Deleted.]

Senator **Bingaman**. [Deleted.]

Major **Steadman**. Yes, we do—[deleted] but we have several.

Senator **Bingaman**. [Deleted.]

Major **Steadman**. I really cannot speak for our system; I am not that familiar with it.

Mr. **Perle**. I am afraid I cannot either. I am unaware of any significant program of that nature.

Senator **Bingaman**. [Deleted.]

Major **Steadman**. In this context I cannot explain beyond that fact.

Mr. **Perle**. There is a classification problem.

Senator **Bingaman**. All right, fine.

Major **Steadman**. Just in summary of those current [deleted].

Mr. **Perle**. I wonder if I might just add one point there. [Deleted.]

So there is a real asymmetry on that side of the capability as well.

Major **Steadman**. One clarification I should make. [Deleted.]

Senator **Bingaman**. Mr. Chairman, is it possible to get some idea? I mean, "future" is a big time period.

Major **Steadman**. Within the next 10 years.

Senator **Bingaman**. Within the next 10 years?

Major **Steadman**. [Deleted.]

In the area of future space weapons, the space plane—[deleted].

Ground-based lasers we have already discussed. [Deleted.]

In the space-based area we know they are working vigorously on a space-based laser program. [Deleted.]

The space station, which they told us several times in open source that they intend to field by the late 1980's, [deleted].

Senator **Bingaman**. Mr. Chairman, I am not trying to get into things that are beyond the classification of this room, but it strikes me that if you are saying that some of the ground-based lasers are to be developed in the next 10 years or they will have the capability in the next 10 years, it seems to me that is contrary to some of the other information we have already received this morning, and at whatever level of classification we are I would like to know about it.

It seems to me we should not have one bit of information that is classified in one level and another bit of information that is classified at another level and one of them is true and one of them is not.

Senator **Warner**. Let us pause a moment and see if we can clarify it. The witnesses that we have had are present here.

Major **Steadman**. [Deleted.]

Senator **Bingaman**. [Deleted.]

Now did I misunderstand what was said?

Major **Steadman**. [Deleted.]

Senator **Bingaman**. [Deleted.]

Major **Steadman**. [Deleted.]

Mr. **Perle**. I think the distinction that is being drawn here is [deleted].

Senator **Bingaman**. [Deleted.]

Major **Steadman**. That is correct.

Senator **Bingaman**. So that is not something that is 10 years down the road. [Deleted.]

Major **Steadman**. Correct. That is what we are projecting.

Senator **Bingaman**. Could I also ask on the space-based lasers 10 years down the road you expect them to have space-based lasers?

Major **Steadman**. [Deleted.]

Senator **Bingaman**. What kind of lasers are we talking about here? I mean, what kind of a laser are they going to have up there in space? What wavelength? Is this chemical lasers [deleted].

Mr. **Gardner**. We can only speculate on that to some extent, but let me contrast the technology required for these space-based lasers to the technology that we are attempting to develop as part of the strategic defense initiative. Perhaps that would be illuminating in this respect. [Deleted.]

So the fact is that directed energy weapons will initially be able to destroy [deleted].

Senator **Bingaman**. Mr. Chairman, I hate to take any more time.

Senator **Warner**. I think the questions are constructive, so please proceed.

Senator **Bingaman**. Thank you.

SPACE LASER WEAPONS

My concern is this: I understood Bob Cooper and Dr. DeLauer the other day to testify that we were going to spend $24 or $25 billion between now and 1988 or 1989 and we were going to, at that point, know whether or not we can put in space these laser weapons, and I did not think they were talking about any [deleted]. I thought they were talking about substantially less than [deleted]. We would know at that time whether that was feasible to do that. [Deleted.] It just strikes me why if we know that they are going to have it, why don't we know that we can have it?

Mr. **Gardner**. I was attempting to clarify that point in the comments that I made. I think that what Dr. Cooper pointed out was the fact that we anticipate needing very powerful lasers to be able to destroy responsive Soviet boosters during their boost phase such that they are capable of generating fluxes of this [deleted]. The lasers required to destroy satellites can afford to be considerably less powerful and because of that I think that everyone agrees it can be available much more quickly.

Senator **Bingaman**. OK. So we are not talking here about space-based lasers that would be anything comparable to what we are trying to develop for the strategic defense initiative.

Mr. **Gardner**. That is correct. These would be lower-powered lasers that would be capable of being effective against satellites.

Senator **Nunn**. Would they be effective against our own space defense systems, the things that we may put up in space after this space-based effort? Are these things likely to be effective against those so that we would not really be able to put them up or keep them up?

Mr. **Gardner**. Well, one of the central elements of the strategic defense initiative is addressed to the question of the survivability of our defensive components, particularly those that are in space. So we have a very aggressive portion of the program looking at a number of ways of increasing the survivability of our satellites.

Senator **Nunn**. It seems to me like that has to get out in front of everything else; otherwise, you all are going to spend $26 billion by 1990 to decide how we proceed further, and I assume we do not want to proceed further if we are going to get everything we put up there shot down.

Mr. GARDNER. That is a very key point, Senator, and one that has received a lot of attention.

Senator NUNN. Should that not be leading the way? Do you not have to decide that before you can decide—I do not know how much that costs. Let us assume it costs $3 billion, $5 billion, whatever. Do you not have to make that kind of judgment before you rationally spend the other $20 billion looking at systems?

Mr. GARDNER. Well, the Fletcher Commission in its recommendations to the Department of Defense agreed, made their recommendation on proceeding on the program on the basis of the considered technical judgment that such survivable techniques could successfully be applied to the defensive component and they supported that.

Senator NUNN. It looks to me like we are way behind the power curve in that direction. You are saying this stuff is going to be up there in 10 years. We had a presentation the other day where in 10 years, after $26 billion has been spent, we will then find out whether we want to do anything, and you are saying all those things are already sitting up there.

Mr. PERLE. But the objectives are quite different. It is the difference between the capability to destroy a Christmas tree ornament and the capability to destroy a concrete block.

Senator WARNER. One of the problems—and I think we are going to have to determine this in this committee—is to determine the necessity for another hearing, because today we have Secretary Perle, primarily on policy. Dr. DeLauer came in and the orientation of that other hearing was space-based ballistic missile defense systems, and we are now determining there is a great deal of interchangeability between all of these systems. And it is very perplexing for the members of this committee to try and get the scientific data, policy data all reconciled.

Now I am of the opinion we have got to bring Mr. Perle back, Dr. DeLauer, and we need to get in parallel the relationship between the ASAT systems and the space-based systems and our ground-based systems as it relates to not only the satellites but ABM and tie it all together.

Do you not think so?

Senator NUNN. I think so, too, because it is like we have got two different modular blocks here and the threat, and what we are trying to do are out of synch. It seems to me that the threat, if this is correct, is going to be so great by the 1990's that the very things we are spending huge amounts of money to do now are going to be, could be, at least, rendered moot by that.

I do not know. I mean, I just see things in modular blocks, but I do not see any overall coherent look at all of them, and that is what you are saying.

Senator WARNER. Somebody must be doing that, and now we are going to have to, as a committee, bring the varous witnesses together who can properly fabricate that.

Mr. Secretary, you have been most patient this morning. We do want to press on here. So let us get the benefit of what DIA can provide, followed by your observations.

When you initiate your testimony again, Mr. Secretary, would you acquaint the committee with any questions to which you responded to the press that might have been over and above what you provided to the committee? I am not saying that by way of criticism. I know that you were engaged in a dialogue there and I do not want members of the committee to read something which did not transpire in the hearing.

Mr. **Perle**. It will be attributed to Senator Nunn anyway. [Laughter.]

Senator **Warner**. Major?

Major **Steadman**. To support the massive program they have under way with the [deleted] launches that occurred in 1983, they employ [deleted] launch vehicles, all of which were utilized during that last year [deleted].

This is the space plane I alluded to earlier. [Deleted] scale model of this particular new system flown three times [deleted].

Senator **Warner**. What is its mission?

Major **Steadman**. [Deleted.]

Senator **Warner**. [Deleted.]

Major **Steadman**. [Deleted.]

Mr. **Perle**. Forgive me. I did not see this slide until I got here. It looks a lot in shape like the space shuttle. Could you say anything about how it compares?

Major **Steadman**. [Deleted.]

Senator **Nunn**. Now tell me again what that is.

Major **Steadman**. [Deleted.]

Senator **Nunn**. What is the payload in that?

Major **Steadman**. [Deleted.]

Senator **Warner**. [Deleted.]

Major **Steadman**. [Deleted.]

Senator **Nunn**. It looks very small.

Major **Steadman**. [Deleted.]

Senator **Warner**. [Deleted.]

Major **Steadman**. [Deleted.]

Senator **Warner**. This does not show any classification, does it? I would assume it is classified.

Major **Steadman**. This is not classified because the Australians released it.

Senator **Warner**. I would again urge that you mark these either classified or unclassified, because the committee receives an enormous amount of material. We need every bit of help we can get.

Major **Steadman**. Yes, sir. It is an instructive comment and the next time I come over I will make sure that each is appropriately marked on the slide.

[Slide deleted.]

[Deleted] a huge launch vehicle, a Saturn V-class vehicle we term the SLW. It is capable of carrying to low Earth orbit 150,000 kilograms, which is about five times the maximum payload capability of our space shuttle system. [Deleted.]

[Slide deleted.]

[Deleted.]

The large manned space complex the Soviets have indicated several times they plan to deploy by the late 1980's, is depicted here in an artist's concept. [Deleted] that they are developing will simply be subsystems to this expanding manned complex. [Deleted.]

Senator **WARNER**. Is that unclassified? Clarify for the record what we can address in public.

Major **STEADMAN**. That is classified Secret. [Deleted.]

Mr. **PERLE**. As I said earlier, we will scrub this as much as possible to the extent that we can to make it releasable.

Senator **WARNER**. That would be a scrubbing operation of the testimony received today, then. What is the drop date, if I might use that term, for your report to the Congress?

Mr. **PERLE**. The 31st of this month.

Senator **WARNER**. And that will cover all of this in open, to the extent that it can be divulged?

Mr. **PERLE**. That is correct. It will have some classified annexes, but we will make as full a presentation as possible unclassified.

Senator **WARNER**. And that will cover things like the space station? It will be a comprehensive report or just ASAT?

Mr. **PERLE**. Well, it is in response to a legislative requirement. It will not be everything that you will want, but we can provide additional material.

Senator **WARNER**. As we are getting deeper and deeper into this subject it is important for the members of this committee to discuss this in public as well as in executive. The report due on the 31st is in response to what request specifically from the Congress?

Mr. **GAFFNEY**. The House Appropriations Committee initiated the request. It is incorporated in last year's military appropriations bill. The principal focus of it, Senator, was the ASAT program. The current draft does a fair job of addressing the Soviet military space program and threat, but the principal focus will remain on the ASAT system.

Senator **WARNER**. So it does cover the whole spectrum?

Mr. **GAFFNEY**. But not all of it will be unclassified.

Senator **WARNER**. I understand that.

SOVIET SPACE STATION

Senator **QUAYLE**. Are the Soviets going to get the manned space station up in late 1980's.

Major **STEADMAN**. They have had one up for about 10 years in the form of the Salyut space station. They have told us most recently in an interview with one of the cosmonauts that they plan by the late 1980's to have a larger station there. [Deleted.]

Senator **QUAYLE**. But you are saying comparable to what we are discussing in our own country here that the Soviets can have a manned space station, [deleted].

Major **STEADMAN**. They have had a manned space station in orbit for over 10 years. This will be a permanently manned space station.

Senator **QUAYLE**. [Deleted.]

Major **STEADMAN**. [Deleted.]

Senator **QUAYLE**. This is why I have a hard time comprehending they are going to do this [deleted].

Mr. **PERLE**. [Deleted.]

Senator **QUAYLE**. But I would think there may be some technology there that they may use to move toward that manned space station.

Mr. **Perle**. A lot of our technology, I expect.

Senator **Quayle**. We are looking at all these figures right now. A lot of people are looking a little perplexed, and I am trying to figure out how accurate they really are. I know it is difficult to project in the future, but before we get going too far on these things I think we had better make sure—does the CIA agree basically with what you have told us this morning?

Major **Steadman**. Yes, sir. You may have been out of the room or perhaps we covered it at an earlier point.

This is the intelligence community position. [Deleted.]

As far as their manned program goes, this is an artist's concept of their current Salyut 7, manned by two cosmonauts right now—[deleted]. This is the Soyzut spacecraft that transports the cosmonauts between Earth and the space station.

This is also the same configuration as an automatic resupply vehicle that brings supplies to those cosmonauts.

Senator **Warner**. Could I interrupt for a minute? For the convenience of the members, how much more time do the various members have to attend? Let us try and determine what remains in testimony and how much time do you individually have?

Senator **Bingaman**. I have to leave in about 15 or 20 minutes.

Senator **Quayle**. I have to leave by 12:15.

Senator **Warner**. Well, let us see what we can do to capsule this hearing in another 20 minutes.

Major **Steadman**. I will wrap it up in 1 minute here. [Slide deleted.]

This summarizes the threat 10 years from now. [Deleted.]

In conclusion, we feel that the [deleted] which brings us right back to that policy and doctrine that we looked at initially—mastery of space is considered by the Soviets as an important prerequisite for achieving victory in war. Everything we see them doing is fulfilling the requirements of that doctrine.

That concludes my briefing.

Senator **Warner**. What is the date for that statement?

Major **Steadman**. 1965.

Senator **Warner**. Now is that the only enunciation that has relevance in this area that they have made publicly?

Major **Steadman**. No; there are other statements that have been made of a similar tone.

Senator **Warner**. In other words, it is a continuing public assertion by them that they are going to use space?

Major **Steadman**. Their public assertions have diminished and are more difficult to find.

Senator **Warner**. Diminished? Is that the word you used?

Major **Steadman**. They do not make it as blatantly evident that that is what their intent is. The programs we see continuing to come reinforce the doctrine.

Mr. **Perle**. This continues a very interesting pattern, Mr. Chairman, of a change on Soviet public statements that is contradicted by the thrust of Soviet programs.

And the other striking example of it is that the Soviets no longer talk publicly about limited nuclear war because they have a major propaganda campaign under way to accuse the United States of preparing for limited nuclear war, but we see a very high level of investment and exercising aimed at a limited nuclear war capability on the Soviet side.

They have an ability that no open society has, to preach one thing and practice another.

Senator **Warner**. Now, Mr. Secretary, to give you the opportunity that you came here at 9 a.m. to perform, and that is to discuss in closed testimony your views on this subject. I would like to ask first that you relate any conversations with the press that would be pertinent to the hearing and, second, if you would request Mr. Gaffney to work with the staff of this committee in fashioning a hearing which could encompass this whole subject in a manner that we can get a better grasp of it.

Mr. **Perle**. We will certainly do the latter.

With respect to the questions from the press, they asked the date on which we intended to conduct a test that might be prevented by the current legislation, and the answer is, I said, this fall. [Deleted.]

The only other question was whether an ASAT test program would be more verifiable than the existence of the systems themselves, and I think the answer to that question is we do not know how to verify the test program because it looks like other things.

I had very little to add. If you are experiencing what I experienced when I went through the briefing—and I had the benefit of doing it over a period of 3 days—then you know how we feel. It takes your breath away. It is an enormous program. It is an unrelenting program.

Senator **Nunn**. Is what?

Mr. **Perle**. An unrelenting program, much larger than our own. And I think this notion that somehow we can protect the pristine, nonmilitary quality of space with an ASAT amendment, in light of everything that is going on in space, really reflects our failure to convey what in fact is going on.

The Soviets are making military use of space. I believe they will continue to do so. A negotiation over the one program that we have under way would fit very nicely with Soviet—traditional Soviet strategy of encumbering our program while continuing their own. So I think we have to come to grips with the implications and the inhibitions of the Tsongas amendment.

Now the GAO has done a report in which, I am sure the committee is aware, it is critical of the current U.S. ASAT program, but among other charges that it levels is that we cannot attack all of the Soviet satellites with the program we presently are supporting. We can only attack some of them.

The only reason we are not pursuing a program to attack all of them is we do not think it is necessary to attack all of them. The program is oriented toward the high priority targets in the event that we got into a situation where our security made it essential, [deleted].

[Deleted.]

The program presently put to the Congress would be sufficient to accomplish that mission. The fact that it cannot do anything beyond that, cannot do much beyond that, is really irrelevant to the requirement as we have defined it.

By the way, the current Soviet interceptor, while it is launched by a rather large booster, is itself a rather small object.

[Deleted.]

We do not know how many have been produced, but stockpiling them covertly would be no problem at all.

While the booster is larger, the booster is used, as we have indicated before, for other purposes and the Soviets have made a practice even with respect to some current compliance questions of asserting the legitimacy of equipment that we believe to be in contravention of their obligations by relating it to some other purpose. So the radar at Krasnoyarsk, the Soviets tell us, is really a space tracking radar and, therefore, OK.

These dual purpose equipments made it awfully difficult to verify. In fact, they make it impossible to verify. But beyond that they make it difficult to have an open and shut case, and there are people who argue that because the radar at Krasnoyarsk could have some limited space tracking capability, even though it is an absurd configuration for that purpose, we cannot show conclusively that it is a violation of the treaty.

So we would not only have doubts about what the Soviets were doing, we would have a very difficult problem if we became persuaded they were violating the treaty and persuading others of that fact.

I do not think that there is much I can add, Senator. I think that the briefing and the underlying supporting technical facts really tell the story. We are kidding ourselves if we think that we can keep space free of military uses.

Senator WARNER. I think you have characterized it as a breathtaking session. I was joined by other members of the committee here this morning because I hoped the others would receive the impression that I did.

Now I tossed you a loaded question there in the arms control area, but, Mr. Secretary, I have grave doubts about the effectiveness of arms control agreements in these areas—and at this moment I subscribe to your thesis that it is impossible. I have not done any independent study of my own, but given the assumption it is impossible to verify any type of arms control agreement in this area of antisatellite weapons, I am just wondering how we can in good faith lead the public and the world into other areas and hold out hope in that.

Do you have anything to amplify that?

Mr. PERLE. I think there are differences. The verification problem is a far larger one than we had been prepared to acknowledge.

Senator WARNER. In this area?

Mr. PERLE. In general.

Senator WARNER. In ASAT or across the board generally in arms control?

Mr. PERLE. Well, in ASAT I think we are fully prepared to acknowledge the impossibility, but in general verification is more difficult than this administration or other administrations have been prepared to acknowledge, and I think the reason is obvious.

There is a widespread belief in this country that the negotiation of arms control agreements is in the interest of the United States if they can be made mutual and verifiable, and nobody wants to convey the disappointing message that it is just damned difficult and verification is very uncertain.

But we have now on the table proposals for verification which are problemmatic.

Senator NUNN. Which negotiation are you talking about?

Mr. PERLE. The INF negotiations, for example. Just to give you one obvious example, when it was our proposal to the Soviets that we eliminate entirely intermediate missiles in the INF negotiations, we had reasonable confidence that we could verify that because they would have had to dismantle the entire structure that supports the SS-20. If we had seen even a single SS-20 you would have an open-and-shut case for violation.

But when we went from the total elimination to equal levels we enormously complicated the verification problem, because while we can count launchers, or we think we can count launchers, we cannot count missiles, and in an agreement to limit each side to 100 SS-20 equivalents we would inevitably mean 100 launchers, and that could mean 200 or 300, or 400, or 500 missiles, with reload missiles.

So we were accepting in principle an enormous uncertainty. But nobody wants to stand up and say that the prospects are so uncertain that we should abandon the effort, and I hope that we will be straightforward with you on what can and cannot be verified.

I know that during the SALT II deliberations when the executive branch witnesses came before this committee they made overly optimistic representations about what can be verified and I believe they did so knowingly. I hope that we do not repeat that performance, but the pressure to do so is very great and we now find an enormously complicated set of issues about Soviet compliance with provisions of the SALT II agreement that we were confidently told we could verify with a high degree of confidence, and it turns out we cannot.

Senator NUNN. Well, it seems to me that is an important thing, but it also seems to me that once you have found out and indeed know that they are cheating and you still do not know what to do about it—and I say "you" with a "YOU," including all of us—then verification itself becomes less important because, query, why verify violations if you do not have anything that you can do about it once you found out about it? That is where we are right now.

Mr. PERLE. Well, I do not think we are without remedies.

Senator NUNN. Well, if the remedies are so unpalatable politically that nobody is ever going to entertain them, you and I know that if this President is not willing to entertain them, it is not very likely that his replacement will be. So I mean it seems to me we had better find out what the heck we are going to do once we find out they are not living up to treaties, and then be properly concerned, as we should be, about whether we can verify.

But if you do not have a sanction, verification itself is not that important.

Mr. PERLE. It becomes a source of frustration more than anything else, but I think you would agree, Senator, that the worst possible outcome would be for the administration to propose a package of remedies, responses to Soviet violations, and have it rejected in the Congress. I think that would deal a fatal blow to, among other things, the prospects for future agreements.

Senator NUNN. Well, I am not sure the administration would require the approval of Congress. It certainly is ideal and certainly needed, but whatever sanctions the administration comes up with would not necessarily have to have legislative approval. I am not suggesting that an administration, if it were of the Winston Churchill frame of mind, having recalled that incident very well, the administration could take action itself.

Mr. PERLE. There are things the administration can do without going to Congress. Many of things that are obviously candidates on the list of remedies would in fact require congressional approval.

Senator NUNN. We all know that an administration that really would take tough action against the Soviets for violations would have to be an administration that had the perception in this country and around the world that they were very eager for arms control. That in spite of their sincere, deep-seated belief in and quest for arms control, they were going to be willing to take very severe steps to interrupt the process because of Soviet violations.

Frankly, some administrations can do some things and other administrations can do others, and it may very well be because of the perception—I am not arguing whether it is right or wrong—that this administration has never been interested in armed control that that very perception, paradoxically prevents this conservative Republican administration from taking strong steps to correct or punish Soviet violations.

We are in a curious "Nixon goes to China" type reverse dilemma.

Mr. PERLE. It is a nice point, but there are a lot of permanent personalities with great influence whose commitment to arms control is beyond question who, were they to demand a response to Soviet violations, would make it a lot easier for the administration to act.

I think it has to be a bipartisan, executive-congressional arrangement.

Senator NUNN. You are saying this President needs help from the left and right, in dealing with the Soviets? [Laughter.]

Mr. PERLE. I think if the President were to announce a response and be criticized——

Senator NUNN. I will call Paul Warnke right after this hearing and tell him that President Reagan wants to see him immediately. [Laughter.]

Senator WARNER. Senator Quayle?

Senator QUAYLE. Let me say one thing that is sort of troubling me here listening to all of this. You know, if all of those things are going to come true and they are going to become operational by the late 1980's or the early 1990's, and we are going to go ahead and get into this strategic defense initiative, I think to pour money in to get these missiles at the boost phase from our satellites, is going to be very difficult. I think all those space-based systems would be vulnerable and could be shot down.

I was somewhat under the impression, and I certainly got this from Dr. DeLauer, that we were proceeding on this road because we are and could continue to be technologically superior to the

Soviet Union in this area. That, in fact, we could get out ahead of the Soviet Union in the strategic defense area and I think the thinking is that we could stay out ahead, and if we can do that—if we can get out ahead and we can stay out ahead, then let's do it. We are willing to take that risk and spend the money.

[Deleted.] I think we are back at square No. 1, Mr. Chairman, on where we are going to go on the whole strategic defense issue. I was under an entirely different understanding of where we were from the technological point of view with the strategic defense initiative, and I certainly got that impression from Dr. DeLauer when he was here. Now I am very perplexed and somewhat confused.

We are going to have to sort this out. [Deleted] we are going to have to rethink our whole military space strategy.

Mr. PERLE. There are differences between the capability to destroy ballistic missiles in the boost phase and, in particular, heavy ballistic missiles with a lot of armor plating, and throw weight means something. There is a big difference between that and the destruction of relatively delicate satellites in space, and the focus of the briefing you have had and the focus of our concern at the moment is coping with the destruction of satellites in space.

Senator WARNER. Mr. Secretary, I think you acknowledge that this is probably beyond your area of expertise to get into the technology.

Mr. PERLE. I would not dream of addressing the technical side.

Senator WARNER. And you realize the necessity for the subcommittee to convene in a subsequent hearing those persons who have the range of knowledge, including yourself from the policy aspect, and we will really get into it and try to put, as Senator Nunn said, some modules together.

Having said that, if there is nothing further by the witnesses we will adjourn this hearing.

Senator NUNN. Mr. Chairman, before we close the record, let me say that I appreciate your leadership in this respect. You are getting the witnesses here. It is a tremendous problem, and it is a huge amount of risk and a huge amount of money, and I think you are proceeding in the right direction.

Senator WARNER. [Deleted.]

Thank you very much.

Mr. PERLE. Thank you.

[Subsequent to the hearing, the following questions were submitted to Assistant Secretary Richard Perle to be answered for the hearing record:]

QUESTIONS SUBMITTED BY SENATOR JOHN WARNER

ASAT

Senator WARNER. Mr. Perle, could you comment on the likely Soviet response to a U.S. proposal to ban ASAT's if the U.S. does not have an operational system of its own?

Secretary PERLE. Before the recent text of the U.S. ASAT system, there was a complete imbalance between the two sides' ASAT capabilities—the Soviets had an operational system, the United States only a "paper design" system. In the absence of a U.S. commitment to develop and test an ASAT capability, the Soviets would have little or no incentive to agree to effective limits on their own system.

Senator **Warner**. Mr. Perle, one often hears concerns expressed that our ASAT will foster instability by "blinding" the Soviets. Are the potential targets of the current U.S. ASAT program Soviet early-warning satellites or their targeting satellites?

Secretary **Perle**. The U.S. ASAT system cannot and need not attack Soviet early warning satellites at high altitudes. The potential targets for the U.S. ASAT system are those Soviet satellites which threaten U.S. and Allied terrestrial forces in time of war. All of these threatening Soviet satellites operate at low altitude. Without low altitude satellites to detect or confirm detections of terrestrial targets, Soviet space-based targeting data would be significantly reduced or degraded. Hence, the U.S. MV ASAT capability to attack only the Soviet low altitude satellites would serve U.S. deterrence objectives.

Questions Submitted by Senator Strom Thurmond

ASAT

Senator **Thurmond**. Mr. Perle, thank you for joining us today. Mr. Chairman, you, as always, are preparing an excellent record in support of the President's strategic programs.

There has been a lot of criticism about our intentions to develop an anti-satellite weapon. It seems odd to me that people in this country would concede such an advantage to the Soviets by stopping our testing in light of the fact that the Soviets already possess such a capability.

Critics of our program refer to the Soviet system as crude or unsophisticated. I have been around the defense business a long time and probably the most unsophisticated weapon is a club, but if your opponent has a club and you do not, then you have a serious technology gap.

Mr. Perle, is the Soviet system crude?

I believe you have stated that a ban on anti-satellite weapons cannot be verified. Is that correct?

Soviet violations of arms control agreements are very disturbing. Would you outline for us what you believe their specific goals are and whether or not they can reach their objectives?

Secretary **Perle**. Although the technology employed in the Soviet system was developed many years ago, it is adequate to have produced a system that is operationally deployed and has demonstrated repeatedly that it can threaten low-altitude satellites.

[Deleted.]

The technology being used in the U.S. MV ASAT system, now undergoing flight-testing, is certainly superior to the technology used in the Soviet system. However, any vehicle, regardless of the state of its technology, that is capable of maneuvering into proper intercept orbit and detonating a warhead at the proper time to destroy a satellite target should not be considered "crude".

In addition, to this date, the U.S. ASAT system remains unproven. While we expect it to perform to design specifications, our experience has shown that technical problems that could delay its operational status are possible on any test program.

Senator **Thurmond**. I believe you have stated that a ban on anti-satellite weapons cannot be verified. Is that correct?

Secretary **Perle**. In general, verification of arms control agreements suffers from the extremely asymmetric degree of openness between the United States and the Soviet Union. The closed Soviet society and the general Soviet tendency toward secrecy make U.S. monitoring and verification of compliance very difficult. This problem is aggravated for ASAT systems because the satellites which serve U.S. and Allied security are few in number. Cheating on anti-satellite limitations, even on a small scale, could pose a disproportionate risk to the United States.

In this regard, the Soviets would have a far easier problem of verifying compliance with limitations on the U.S. ASAT system than we would have on the Soviet system. For example, a ban on all ASAT systems would require that the Soviet ASAT interceptor system be eliminated. The Soviet interceptor is relatively small and is launched by a type of space booster that the Soviets use for other space launch missions. It is not clear how many interceptors or boosters have been manufactured. The USSR could maintain a covert supply of interceptors which could be readied quickly for operational use, probably without risk of U.S. detection. Launch vehicles could be diverted from other missions to launch ASAT interceptors.

Verification problems apply to other aspects of space arms control as well. For instance, tests of a ground-based laser ASAT weapon could be concealed. In addition, determining with confidence whether an object hundreds of kilometers above the earth has been damaged could, in practice, be extremely difficult, and from what source it has been damaged could be extremely difficult or impossible. It may be difficult to determine whether a satellite has been damaged by electronic countermeasures. It is also difficult, or in some cases could be impossible, to determine whether an orbiting satellite contains a weapon.

Additional verification problems arise if ASAT testing is banned or limited. The wide variety of ASAT systems and the fact that ASAT capabilities can be a by-product of systems developed for other missions, create problems of identifying what would be prohibited under testing limitations. The fact that ASAT capabilities are inherent in some systems developed for other missions or are amenable to undetected or surreptitious development makes it impossible to verify compliance with a truly comprehensive testing limitation that would eliminate tests of all methods of countering satellites. Test bans for a more limited class of ASAT systems may be verifiable, and these are being studied to determine if they are in our national interest.

Senator **Thurmond**. Soviet violations of arms control agreements are very disturbing. Would you outline for us what you believe their specific goals are and whether or not they can reach their objectives?

Secretary **Perle**. The Soviets regard arms control negotiations as a means of enhancing their capabilities to achieve military objectives. The Soviets, as we reported in the most recent edition of Soviet Military Power, seek to enhance ". . . the coercive leverage in powerful nuclear forces to induce paralysis in weapons programs and create political disarray in the free societies. In wartime, they would regard the threat or actual use of those forces as the key to the successful prosecution of the conflict."

Soviet ability to achieve its objectives depends in part on what the United States does. During the 1970s the United States practiced unilateral restraint in its force modernization while the Soviet Union expanded its strategic forces to unprecedented levels. By 1980, despite two arms control agreements a situation existed in which the Soviet Union could threaten our ICBM force with a surprise nuclear attack, and threaten our bomber force prior to launch and during penetration of Soviet territory.

In the future, Soviet ability to achieve military objectives related to strategic nuclear forces will also critically depend upon U.S. military programs. We must modernize our forces in order to be able to maintain deterrence. We must respond to detected violations with any necessary compensating actions and convince the Soviets of the necessity and benefits of compliance.

Questions Submitted by Senator Carl Levin

ASAT

Senator **Levin**. The Tsongas amendment says no funds can be expended to test any U.S. ASAT against an object in space unless the President certifies that the U.S. is endeavoring in good faith to negotiate a mutual, verifiable ASAT ban with the USSR: and that pending agreement on such a ban, such testing is necessary "to avert clear and irrevocable harm to the national security." Will the President certify on both counts?

Secretary **Perle**. Presently the administration is studying the many aspects of a ban on specialized anti-satellite weapons as well as other forms of space arms control. This study has been undertaken with a view toward negotiations with the Soviet Union and other nations, if compatible with our national security interests. The difficulties associated with a comprehensive ban, and therefore with negotiations on such a ban are formidable. There are, for example, very difficult verification problems, as well as the related problem of breakout—the risk that one nation could gain a unilateral advantage by suddenly abrogating a ban and obtaining a head start in building or deploying anti-satellite weapons. Further, because a number of non-ASAT weapons have a capability to damage space objects there are complex definitional problems. Finally, our interest in limiting threats to central U.S. satellites must be balanced against our need to counter Soviet satellites that can aid in targeting U.S. and Allied forces. We are endeavoring to respond to the thrust of the Tsongas amendment by concentrating our ongoing studies on limited arrangements that would ban or otherwise limit specific weapon systems. It should be noted that the Administration would not be required to certify until late 1984 when the U.S. ASAT system is planned to be tested against an object in space.

Senator **Levin**. The late Soviet leader, Yuri Andropov proposed a moratorium on Soviet ASAT tests if the U.S. stopped plans for its tests. Has the new Soviet government renewed this offer?

Secretary **Perle**. It should also be noted that Andropov's moratorium offer of August 14 was not made formally in the Soviet draft treaty or in any other diplomatic channel. The moratorium on ASAT systems offered by Andropov was reiterated, but not through formal channels. General Secretary Chernenko made a direct reference to the ASAT moratorium on May 20 in his response to the letter by two American scientists. In his June 11 interview with Joseph Kingsbury-Smith he also stated that Moscow is in favor of entering talks on banning the use of ASAT weapons.

We would note that the wording of this proposal has certain ambiguities such as whether the moratorium would cover tests of all ground-based as well as space-based ASAT systems.

One should remember, furthermore, that the U.S.S.R. has the world's only operational ASAT system, which it has maintained and has tested more than a dozen times since the 1960s.

The Soviet offer of a moratorium is not acceptable, since it would effectively put the U.S. in the position of accepting for the indefinite future a proven Soviet ASAT capability while the U.S. would be prevented from developing and testing a system of its own. This would leave the U.S.S.R. with a unilateral advantage, which would undermine both conventional and nuclear deterrence.

Senator **Levin**. Has the U.S. formally responded to this offer; when, how and what? What has the U.S. done to get the Soviets to the table to discuss ASAT limits?

Secretary **Perle**. Since the Soviet moratorium was not offered in formal channels, the U.S. has not responded formally to the Soviets but has made known its view concerning the moratorium in numerous public statements.

With regard to discussions of ASAT limits, the President's March 31 report to Congress notes that, while we have been intensively studying this area, we have found no arrangements or agreements beyond those already governing military activities in space that are judged to be in the overall interest of the U.S. and its Allies.

The United States is continuing to study space arms control, in search of selected limits on specific types of space systems or activities in space which could satisfactorily deal with the many problems outlined in the President's report. Until we have determined whether there are, in fact, practical solutions to these problems, we believe a moratorium on U.S. testing of the MV system would be an unwarranted concession to the Soviets, given the existence of an operational Soviet ASAT system and our need to defend against Soviet targeting satellites. The United States remains ready, however, to examine the problems and potential of space arms control at the Conference on Disarmament.

Senator **Levin**. If the Soviet proposal is unacceptable, why doesn't the U.S. propose an alternative? Are you saying that we really do not want to negotiate?

Secretary **Perle**. As we have said in the past, the United States supports responsible efforts to control arms in outer space. While we have been intensively studying this area, to date we have not yet found arrangements or agreements beyond those already governing military activities in space that are judged to be in the overall interest of the United States and its Allies. Our efforts to identify such arrangements are continuing. However, existing Soviet ASAT capabilities, monitoring difficulties, our concerns about Soviet targeting satellites and the fact that ASAT capabilities are inherent in systems designed for other purposes make this a difficult task.

Senator **Levin**. If the U.S. has not proposed alternatives or asked the Soviets to negotiate ASAT limits, how will the President be able to certify to the first part of the Tsongas amendment?

Secretary **Perle**. The certification required by the Tsongas amendment would not be required until the ASAT system is tested against an object in space. The first test against an object in space is not planned until late in 1984. Prior to that test we expect to have completed our analysis of ASAT arms control options which will provide some insight into the possibility of verifiable and equitable arms control options that are in the national interest of the United States.

Senator **Levin**. Isn't it necessary for the Soviets periodically to test their current ASAT to have any confidence it would work when needed? Considering its poor performance record, wouldn't a ban on its further testing eventually mean the Soviets could no longer count on its utility? Why wouldn't testing limits on it as well other ASATs be verifiable?

Secretary **Perle**. a. While it is desirable to periodically test operational systems to verify their current operation and reliability or to improve their performance, it may not be necessary to flight test a system for extended periods of time. For example: after a hiatus of several years in ASAT testing, the Soviets were able to resume testing of their ASAT system without any apparent degradation in its performance. While the Soviets probably desire a higher reliability for their current operational system than has been demonstrated, their ASAT system is sufficiently effective to pose a threat to low-altitude U.S. satellites especially over the period of time required to reinforce our allies during a conventional conflict.

b. The Soviets would have a far easier problem of verifying compliance with certain limitations on the U.S. ASAT system than we would have on the Soviet system. For example, a ban on all ASAT systems would require that the Soviet ASAT interceptor system be eliminated. The Soviet interceptor is relatively small and is launched by a type of space booster that the Soviets use for other space launch missions. We do not know how many interceptors or boosters have been manufactured. The USSR could maintain a covert supply of interceptors which could be readied quickly for operational use, probably without risk of U.S. detection. Launch vehicles could be diverted from other missions to launch ASAT interceptors.

Verification problems apply to other aspects of space arms control as well. For instance, tests of a ground-based laser ASAT weapon could be concealed. In addition, determining with confidence whether an object hundreds of kilometers above the earth has been damaged could, in practice, be extremely difficult, and determining from what source it had been damaged could be extremely difficult or impossible. It may be difficult to determine whether a satellite has been damaged by electronic countermeasures. It is also difficult, or in some cases could be impossible, to determine whether an orbiting satellite contains a weapon.

Additional verification problems arise when ASAT testing is banned or limited. The wide variety of ASAT systems and the fact that ASAT capabilities can be a by-product of systems developed for other missions, creates problems of identifying what would be prohibited under testing limitations. The fact that ASAT capabilities are inherent in some systems developed for other missions or are amenable to undetected or surreptitious development makes it impossible to verify compliance with a truly comprehensive testing ban that would eliminate tests of all methods of countering satellites. Test bans for more limited classes of ASAT systems may be verifiable, and these are being studied to determine if they are in our national interest. The breakout potential of that limited class of ASAT systems is very troublesome and creates doubt that limited test bans could be effective.

The difficult verification problems could, in some cases, be mitigated by future technological developments, or by cooperative measures contained in future arms control agreements. Such possibilities are also under study.

Senator **Levin**. Since many of our most important satellites are in orbits higher than the operational limits of present Soviet ASATs, wouldn't it be in our security interests to negotiate a ban on development of more capable Soviet ASATs?

Secretary **Perle**. The administration is studying bans that would limit threats to high-altitude satellites. However, there are difficult technical problems associated with such bans, including problems of definition and verification as well as the problem of the extent to which high-altitude capabilities can be tested at low altitudes or covertly at high altitude. In addition, a number of Soviet and U.S. satellites utilize highly elliptical orbits which greatly complicate the definition of a "high-altitude" satellite.

Senator **Levin**. If the "genie" is out of the bottle on banning low orbit ASATs, why shouldn't we try to negotiate a ban on high-orbit ASATs, verified through test monitoring, which would protect our most valuable satellite assets? Isn't that in our interest?

Secretary **Perle**. A ban on high-altitude ASAT system is being studied. Whether this type of ban is in U.S. national security interests and whether the technical problems it presents can be overcome, must be analyzed before we can consider possible negotiations.

Senator **Levin**. It has been contended that the U.S. satellites we might lose to a Soviet ASAT are much more important to our military capabilities than those they might lose to our ASAT. Would you agree?

Secretary **Perle**. Both countries are becoming increasingly dependent on the support provided by such systems to employ effective military power through all levels of conflict. Essential [deleted] command and control, and tactical support functions are presently being performed by both countries' space systems and, to a degree, both sides are already dependent on these systems.

Senator LEVIN. What kind of high orbit ASATs are the Soviet developing, and have these programs advanced beyond the point where their interruption by a negotiated ban would deny the Soviets this capability, even if not presently deployed? Have the Soviets tested these capabilities enough times to be confident they would work?

Secretary PERLE. A Soviet high-altitude orbital interceptor capability many be a future threat, but we have no direct evidence of such a program by the Soviets. However we may not obtain such evidence before testing. The Soviets have space launchers available and capable of launching to geosynchronous altitude with nuclear or non-nuclear warheads. Other types of high altitude ASAT systems may appear preferable to the Soviets. For example, they could also use their developing electronic warfare capabilities against high-altitude satellites. We cannot now say which, if any, such high-altitude capabilities may be developed by the USSR.

Continuing, or possible future, Soviet efforts that could lead to high-altitude systems include developments in directed energy weapons. We have indications that the Soviets are continuing development of ground-based lasers with probable ASAT capabilities. There is a possibility that some sensors on some U.S. satellites could be damaged by ground-based Soviet lasers, even up to geosynchronous orbits. In addition, we believe the Soviets are conducting research and development in the area of space-based laser ASAT systems which could be configured for high-altitude attack. We have, as yet, no evidence of Soviet programs to develop ASAT weapons based on particle beam technology.

Senator LEVIN. Aren't their alternatives to ASATs to neutralize Soviet satellite capabilities important to their waging a conventional conflict, such as reducing U.S. radar and electronic signatures which might be detected?

Secretary PERLE. U.S. force structure plans include a balanced package of complementary defensive measures. The capability to counter Soviet satellites is an important element of those plans. To the extent that we limit our capabilities to counter Soviet satellites, we tend to increase our need to augment our conventional forces to perform their terrestrial missions in the face of the Soviet threat from space, with attending costs.

To counter Soviet satellites by attacking their ground facilities would be an uncertain alternative to an ASAT capability and one which risked escalation of a conflict. A U.S. ASAT capability is a less risky and more effective and flexible way to deal militarily with the Soviet space-based threat.

The ASAT MV complements other protective measures which must be used throughout a conflict. These measures include communications and emissions security, evasive maneuvers and electronic countermeasures. These countermeasures are, however, reactive and cannot provide permanent protection. Moreover, they may impose constraints on the operational effectiveness of U.S. systems in a conflict.

Senator LEVIN. What is the cost of developing defensive countermeasures to Soviet ASATs which are alternatives to developing our own ASATs, such as maneuvering satellites and hardened satellites?

Secretary PERLE. The United States has begun to incorporate some features for improving survivability into its satellites. Research is also being conducted to develop technology to enhance the survivability of key U.S. satellites, data links, and ground elements. [Deleted.] Implementation costs for some features can be high. The decision on which survivability features to include in a satellite design must take into account tradeoffs between program costs and the projected threat.

While design features to enhance the survivability of our satellites are very important, it should be noted that major design changes to protect satellites against current and future threats have certain drawbacks, such as expense and possible degradation on mission performance. Additionally, no single defensive measure is totally effective against all threats. Because of these problems, we believe that defensive measures can be an important adjunct to our overall space deterrent but we must also continue to develop our ASAT system to assure the United States has a credible deterrent with demonstated capabilities.

Senator LEVIN. The President's Science Advisor, Dr. George Keyworth reportedly has said it would not be difficult for the U.S. to deploy satellites with defensive devices that jam the electronics of Soviet ASATs. Do you agree, and if that is so, why isn't that preferable to developing an ASAT of our own?

Secretary PERLE. The operational Soviet ASAT interceptor [deleted].

As stated previously, deterrence of the Soviet ASAT system is not the prime purpose of a U.S. ASAT system. The growing threat posed by present and projected

Soviet space systems which, while not weapons themselves, are designed to support directly the U.S.S.R's terrestial forces in the event of a conflict is of great concern to the United States. The U.S. ASAT system, within the limits imposed by international law, is to counter such systems in times of crisis or conflict. [Deleted.]

Senator Levin. The Republican dominated Senate Foreign Relations Committee has urged that a temporary moratorium on U.S. ASAT tests be undertaken to give the U.S. time to open negotiations for ASAT limits with the Soviets and test their willingness to agree to such limits. A lack of such willingness could be greeted by resumption of testing. What are the problems with this approach, since as the committee says in a recent report: "We have lived with the Soviet ASAT for 15 years. A further delay of limited duration in testing the F-15 based system seems justified if it can lead to averting an open-ended space arms race"?

Secretary Perle. The Soviet Union's anti-satellite interceptor system has been operational for over a decade and has been tested repeatedly. The U.S. recently began testing of a system that would lead to a similar capability in the future. A situation in which one side possesses the capability to destory satellites and the other does not is destabilizing. A moratorium would effectively perpetuate that destabilizing situation.

Programs in the research and development phase, as is the U.S. ASAT program, pay a much higher price for a test moratorium. Even a short delay in the test program would significantly delay the time when the U.S. ASAT could be operational. This would decrease, not increase the Soviet incentive to negotiate in good faith.

Senator Levin. Wouldn't Soviet willingness to negotiate/agree to the more intrusive verification procedures which may be required for verifying ASAT treaty compliance be a test of their seriousness to eliminate current ASATs and ban new ones, as claimed by Mr. Andropov?

Secretary Perle. Verification problems extend beyond the reluctance of the Soviet Union to cooperate. Even if we were able to achieve an agreement to ban ASAT systems, and a way were found to verify elimination of the operational Soviet ASAT system, other problems would remain to be solved. For example, the U.S.S.R. could retain the capability to redeploy quickly a system in which they would have confidence. If prior to the ban the United States had not tested its MV ASAT system, the Soviets alone would possess such proven technology. It might take the Soviets a year or less to deploy their system again.

Under a strict ASAT arms control regime, it is conceivable that the Soviets could change the basic character of their ASAT program. They could have additional ASAT capability in equipment amenable to undetected or surreptitious development, which could be brought to operational status, or to a status that would permit rapid "breakout" from the agreed ban.

[Whereupon, at 12:16 p.m., the subcommittee adjourned, to reconvene upon the call of the Chair.]

DEPARTMENT OF DEFENSE AUTHORIZATION FOR APPROPRIATIONS FOR FISCAL YEAR 1985

THURSDAY, MARCH 29, 1984

U.S. Senate,
Subcommittee on Strategic and
Theater Nuclear Forces,
Committee on Armed Services,
Washington, DC.

STRATEGIC COMMAND, CONTROL AND COMMUNICATIONS

The subcommittee met in open session pursuant to notice, at 9:03 a.m., in room SR-222, Russell Senate Office Building, Senator John W. Warner (chairman), presiding.

Present: Senators Warner, Goldwater, and Exon.

Staff present: Robert F. Bott, professional staff member; Douglas R. Graham and Patricia L. Watson, research assistants; and Karen A. Love, staff assistant.

Also present: Gerald J. Smith, assistant to Senator Goldwater; Les Brownlee, assistant to Senator Warner; Jeffrey B. Subko, assistant to Senator Exon; and Peter D. Lennon, assistant to Senator Levin.

OPENING STATEMENT BY SENATOR JOHN W. WARNER, CHAIRMAN

Senator Warner. The subcommittee meets this morning to receive testimony on Strategic Command, Control and Communications.

We welcome Mr. Donald Latham, Deputy Under Secretary of Defense for Communications, Command, Control and Intelligence. Mr. Latham is accompanied by representatives from each of the services who are charged with responsibilities in this important area: Vice Adm. Gordon Nagler, Director, Command and Control, Office of the Chief of Naval Operations; Maj. Gen. James Rockwell, U.S. Army, Assistant Deputy Chief of Staff for Operations and Plans; and Maj. Gen. Gerald Prather, U.S. Air Force, Assistant Chief of Staff for Information Systems.

We welcome you, gentlemen, and we look forward to hearing your report of progress in this critical element of the President's Strategic Modernization Program.

As you gentlemen know, effective Command, Control and Communications Systems, as survivable as the forces they support, have been a priority for this subcommittee even before the President announced them as the highest priority in his modernization program.

We are, therefore, anxious to hear how these programs have fared under the pressure of budget constraints. And we look to your testimony today to establish a record with which to support our funding recommendations for these programs.

First, I will defer to my distinguished colleague, Senator Goldwater.

Are there any comments you would like to make?

Senator **Goldwater**. Anything I have to say about communications I have said before.

Senator **Warner**. We will proceed briefly in open session and then we will go into executive if that is the wish of the witnesses.

STATEMENT OF DONALD C. LATHAM, DEPUTY UNDER SECRETARY OF DEFENSE (COMMUNICATIONS, COMMAND, CONTROL AND INTELLIGENCE), ACCOMPANIED BY VICE ADM. GORDON R. NAGLER, U.S. NAVY, DIRECTOR, COMMAND AND CONTROL, OFFICE OF THE CHIEF OF NAVAL OPERATIONS; MAJ. GEN. JAMES M. ROCKWELL, U.S. ARMY, ASSISTANT DEPUTY CHIEF OF STAFF FOR OPERATIONS AND PLANS (C-4); AND MAJ. GEN. GERALD L. PRATHER, U.S. AIR FORCE, ASSISTANT CHIEF OF STAFF FOR INFORMATION SYSTEMS, HEADQUARTERS, U.S. AIR FORCE

Mr. **Latham**. Thank you very much for having us over this morning. We would like to share with you a briefing that describes the progress we have made in the strategic command control and communications area. The briefing is highly classified at top secret.

Senator **Warner**. Is there any necessity to go into any open session?

[No response.]

Then we will proceed to go into executive session.

EXECUTIVE SESSION

Mr. **Latham**. I would like to share with you a progress report in the strategic communications command and control area.

Discussion Outline

Defense guidance and policy perspective.
Our disinvestment problem.
Enduring C^{3}I: U.S. and "Soviet" views.
New initiatives.
Resources.
Observations.

First of all, I would like to show you the outline of what we will cover. Briefly I would like to share with you two viewgraphs giving the latest information [deleted] to how we view Soviet response to our strategic programs.

Second, I would like to discuss with you briefly the ratio of spending between the two countries and show you the disinvestment problem we are faced with and then talk about the comparison between Soviet and U.S. command and control systems and what the Soviets are doing to build a surviving, enduring command and control system.

Then I will turn to some of the program initiatives we have underway and give you the status of the C^3I program and end up on observations of where we are going from here.

First of all, the key intelligence estimates are that the Soviets really do that [deleted]. They are improving all aspects of their strategic forces.

This last point is important as it [deleted].

I will speak on endurance in a few minutes.

Second, it appears that there is [deleted] evidence that in a conventional conflict there is a high likelihood the Soviets would try to [deleted]. In any nuclear conflict they would attempt to destroy and disconnect the National Command Authority from the forces by attacking communication to delay and disrupt the launch and coordination of the forces and try to prevent reconstitution.

We thus have a heavy burden placed on intelligence command and control, first to deal with strategic warning if it is available and importantly with our whole concept of survival and being able to endure for extended periods of time. We must have [deleted]. We will have to deal with a range of options, not a one shot only option in reacting very timely to tactical warning, and then to be able to conduct some counteroffenses to exploit any weakness he has.

MISSIONS OF STRATEGIC FORCES AND C^3I

Be convincingly capable of responding to a first strike:

So as to deny enemy political miltiary objectives.

Minimize extent to which nuclear threats could be used to coerce U.S. and allies.

Maintain capacity to support alliance commitments.

Should deterrence fail, deny enemy victory at any conflict level.—Limit damage to U.S./allies to extent possible. Force earliest termination of hostilities on terms favoring U.S.

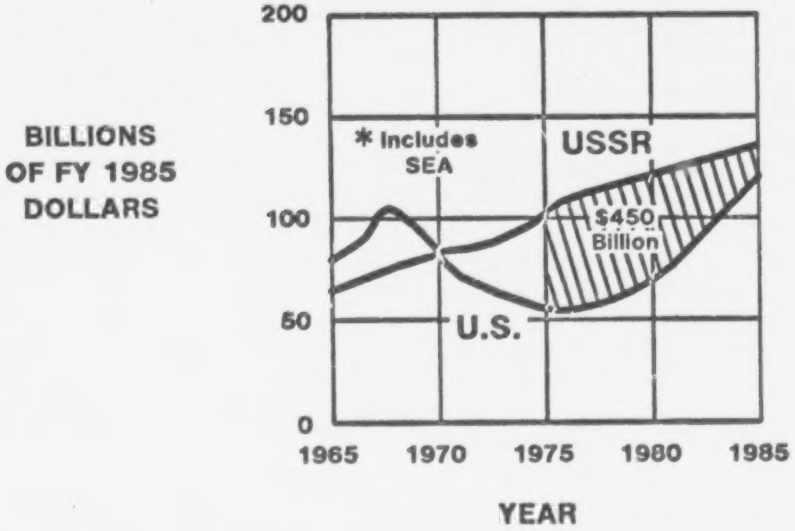
Maintain reserve capabilities.

So, we have to be convincingly capable of responding to any form of Soviet attack so as to deny him the political and military gains he may seek.

If deterrence does fail, the policy says we must provide for early termination of hostilities on terms favorable to the United States and her allies.

I will come back to where we are working on this, we must also limit damage and, importantly from a command and control point of view, [deleted] that you have and to stay connected for extended periods and be able to control [deleted].

U.S. vs. USSR INVESTMENTS



NOTE:

(1) **INCLUDES RDT&E, PROCUREMENT AND MILITARY CONSTRUCTION.**

(2) **INCLUDES NON-DoD-FUNDED DEFENSE PROGRAMS**

*** SEA = SOUTHEAST ASIA COSTS**

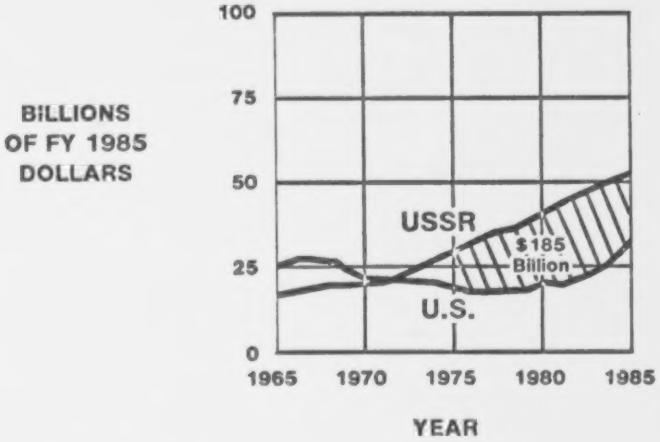
UNITED STATES-SOVIET EXPENDITURES

Let me turn to the disinvestment problem.

What I have plotted here is in fiscal 1985 dollars and in tens of billions of dollars on the ordinate.

Looking at the time frame in 1975 to 1985, it appears that the Soviets have outspent us or will continue to, by the sum of $450 billion which includes RDT&E, procurement, military construction and the DOE portion of the DOD budget.

U.S. vs. USSR RDT&E EXPENDITURES

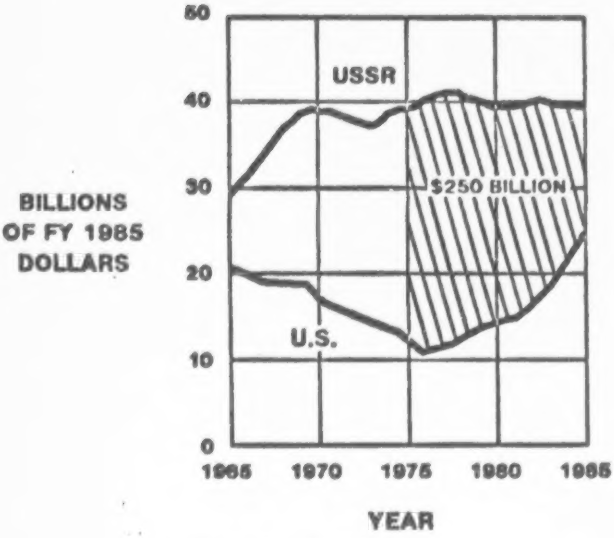


INCLUDES NON-DoD-FUNDED DEFENSE PROGRAMS

If you look at our RDT&E from 1975 to 1985, despite our increased spending in the out years, there is a net deficit of about $185 billion.

ESTIMATED STRATEGIC FORCE EXPENDITURES FOR THE U.S. AND USSR

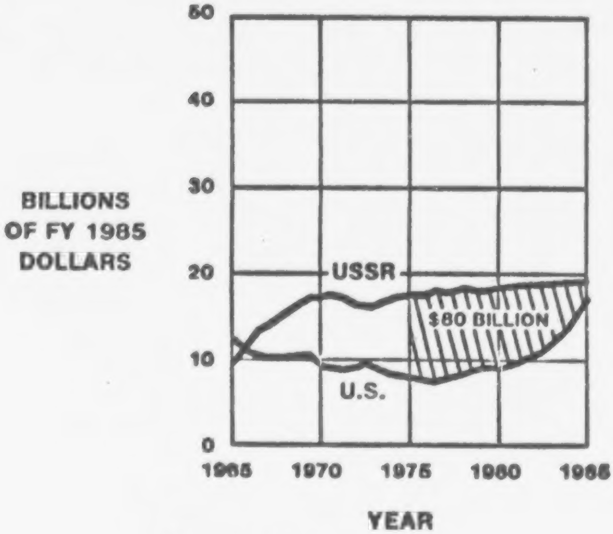
TOTAL STRATEGIC OUTLAYS*



* Excludes RDT&E

ESTIMATED TOTAL STRATEGIC OFFENSE EXPENDITURES FOR THE U.S. AND USSR

STRATEGIC OFFENSE TOTAL OUTLAYS *

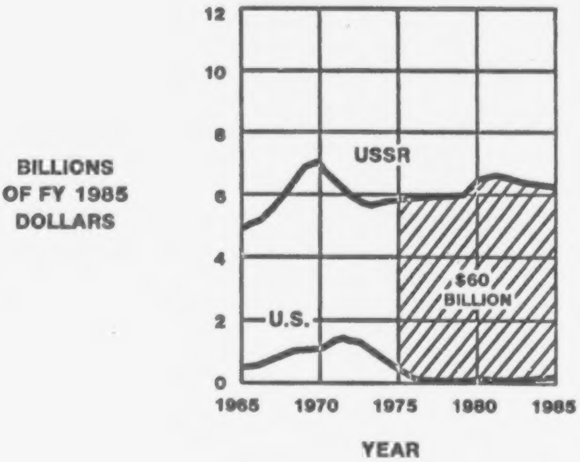


* Excludes RDT&E

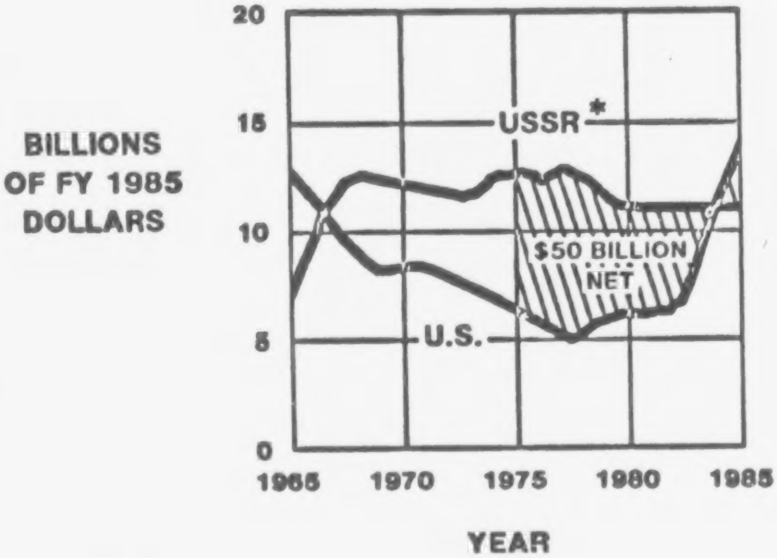
If you look at such key areas as total strategic outlays as plotted here, the disinvestment is about $250 billion and strategic offense total outlays about $80 less billion over this time frame, 1975 to 1985.

If you look at strategic defense procurement outlays, ours has gone almost to zero and there is about $60 billion difference between what we are spending and they will spend over that 10-year time frame.

STRATEGIC DEFENSE PROCUREMENT OUTLAYS

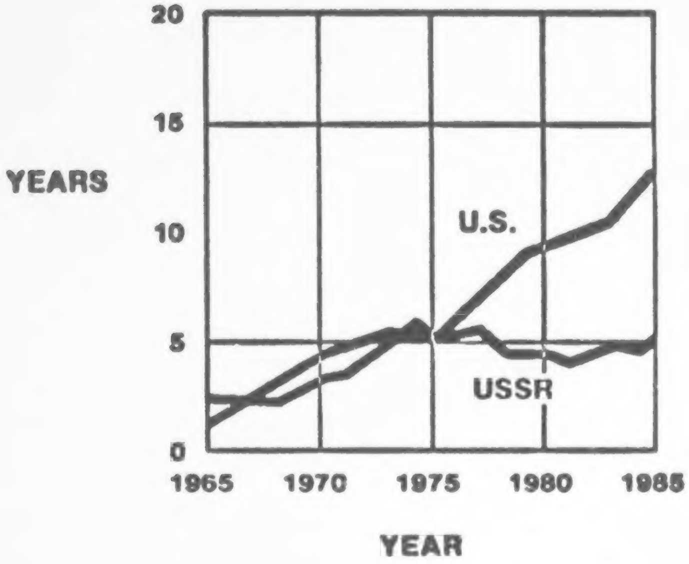


STRATEGIC OFFENSE PROCUREMENT OUTLAYS



* Backfire included elsewhere

AVERAGE AGE - ICBMs



Finally, if you look at strategic offensive procurement outlays, we finally do have a crossover out here in the 1984-1985 time frame, but still about $50 billion net difference in expenditures.

As a result, the Soviet ICBM force is considerably younger. This is years here and includes the U.S. ICBM force over this time frame with a modernization program that we have underway with the MX.

As a result of this, you would conclude there is no way we will ever catch up in spending with what the Soviets have been spending and appear to plan to spend.

SOVIET C^2

I would like to share with you what I call a "Soviet" view of command and control communications. This has been distilled from a lot of Soviet literature. They clearly believe it is very important and they clearly paid a great deal of attention to survivability and endurance.

I am going to talk to that in a lot more detail and show you some [deleted].

They stay very flexible in their command and control—where higher level headquarters will communicate with subordinate headquarters, [deleted].

For example, they conduct [deleted]. They conduct [deleted].

We do neither of the above.

They retain proven systems. They have [deleted] antennas all over the Soviet Union, in fact, several [deleted] of them, many of them hardened.

[Deleted.]

They have very good communications and operations security. They are good at that.

Last, they do have a very good understanding and practice what I call electronic combat at the tactical level as well as the strategic level; that is jam, destroy and exploit whatever they can against the enemy command and control structure.

UNITED STATES VERSUS SOVIET C^2

Comparing Soviet command and control and ours, we have [deleted] facilities in the national military command system. One is the National Military Command Center a few miles from here and the Cheyenne Mountain NORAD complex.

We have a fleet of airborne command posts and airborne relay aircraft. We keep one of these command post aircraft airborne 24 hours a day. The Soviets [deleted].

We are moving toward a more enduring command and control. In contrast the Soviets have a very heavy [deleted]. We have identified some 1,500 facilities. Some of them, and I will [deleted].

They have [deleted] hardened military command and control facilities. They have [deleted] have been identified. They have [deleted] command posts.

Now, this is a viewgraph [deleted] that came out of a very recent joint net assessment of United States and Soviet strategic forces, [deleted]. I thought I would just show you one chart out of that which compares strategic command and control communications and intelligence in the United States and Soviet Union.

The measures that are here are peacetime crisis, initial phase of nuclear and extended nuclear exchanges [deleted].

There are a disturbing number of Xs [deleted]. Our judgment is that the Soviets have a significant [deleted]. We have a long way to go to move some of these Xs back over on this side of the chart.

Let me show you two slides [deleted] charts here that are [deleted]. This is a complex about [deleted].

Now, when we talk about enduring C^3I requirements, I have listed these on this chart.

ENDURING C^3I

The first is that we want to build a system that provides for [deleted].

Next we want to make sure that the system does in fact underwrite deterrence and that it complicates his campaign, that it is not some set piece he can think through and figure out how he is going to win the war.

Last, we are shooting [deleted] endurance. That is the national goal of the forces with supporting logistics and C^3I.

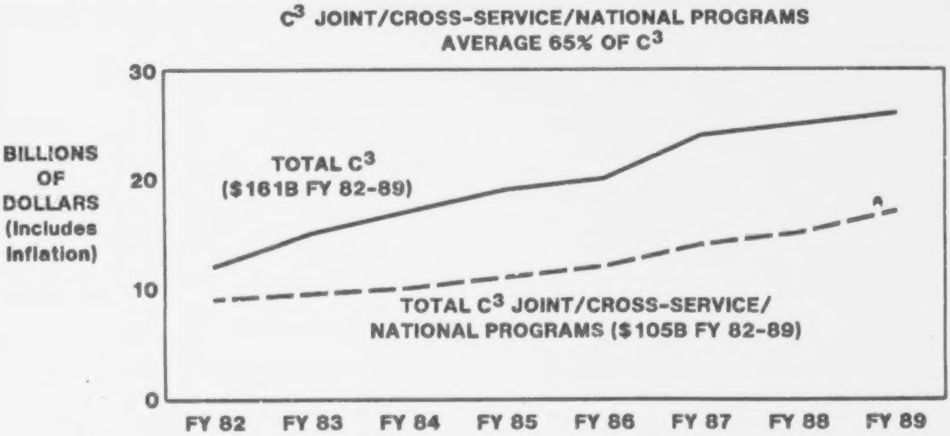
OBJECTIVES FOR STRATEGIC C^3I

Modernize and improve in seven functional areas:
Ballistic missile tactical warning and attack assessment;
North American air surveillance;
Nuclear detonation detection;
Command facilities;
Communications: warning; decisionmaking; force direction;
Navigation and position-fixing;
Satellite mission control.
[Deleted.]

So the objectives for strategic C^3I that we have been directed to do are shown here. We are asking to modernize in these functional areas.

I will give you a status report on how we are doing in each of these areas as we proceed.

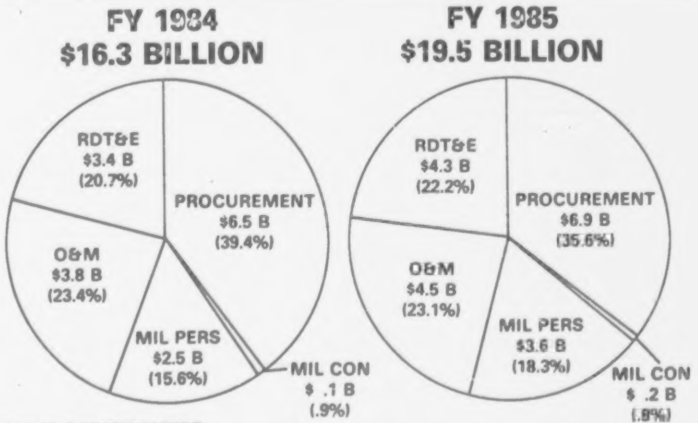
Relationship Between C³ Joint/Cross-Service/ National Programs and C³ Program Resources



SOURCE: EST. DOD FEB 84 FYDP

Let me show you what we are requesting in the way of resources for fiscal 1985. The number is substantial. What I have plotted here and want to show you, when we talk about command, control, and communications program in the Department, about 65 percent of the programs are actually joint, cross service, or allied programs.

C³ PROGRAM
BY APPROPRIATION



SOURCE: DOD FEB 84 FYDP

We have a great deal of trouble in keeping these things funded year to year in some of the program areas. If you look at the fiscal year request, we are asking for $19.5 billion, up from $16.3 billion in fiscal year 1984.

This is a somewhat apples-and-oranges comparison because this number of $19.5 billion includes about $1.2 billion of pay for retired personnel that was not in this fiscal year 1984 number.

So, you really should compare $16.3 billion with about $18.3 billion which is the apples and apples request.

As you notice here, procurement is about $7 billion of the total. If you look at it by mission area——

Senator **Warner**. Just a minute. We cannot see the Viewgraphs. We are getting about 50 percent of this.

Do you think you could bring the projector back so that we can read the charts?

Mr. **Latham**. Yes, we can. We can set it back on the table and move the screen forward.

What we are asking for is this $19.5 billion. Today we are addressing about 24 percent of the total request to the strategic which includes all the communication satellites. I don't want to make you believe that we have only 16 percent roughly in the tactical theater force. Since the military communications satellites provide substantial support to the tactical forces.

STRATEGIC C^3 RDT&E AND PROCUREMENT

[In millions of dollars]

Submission area	Fiscal year 1984		Fiscal year 1985	
	RDT&E	Procurement	RDT&E	Procurement
Surveillance and warning	$252	$697	$266	$500
Command and control	133	473	284	308
Communications	799	926	911	933

In the strategic R&D procurement for fiscal 1985 I have broken it out by RDT&E, it is $1.7 billion in procurement; and about $1.3 billion in RDT&E and O&M and MilPers.

MAJOR INITIATIVES

As I look at the major initiatives we have underway, I thought first I would share with you a very brief status report on where we are in major initiatives.

MAJOR STRATEGIC C^3 INITIATIVES

GWEN in full-scale development.
NEACP redeployed for survivability—four E4Bs funded.
EC–X program in full-scale development.
Mobile command center program underway.
Two new PAVE PAWS procured.
[Deleted] improvements on contract.
BMEWS upgrades underway.
JRSC terminals being delivered.
MILSTAR in FSED.
AFSATCOM terminals being upgraded.
First DSCS III on orbit.
IONDS/GPS on contract.

First of all, the Ground Wave Emergency Network is in full-scale development. We have [deleted] nodes in now. We should have [deleted] nodes in by the end of 1985. It operates at low frequency. Each node is independent with its own power.

The National Emergency Airborne Command Post, we have four of those funded. The last of those will be turned out about 1985. We have a couple of them now.

The ECX Program I will discuss in more detail. We have a command center program underway.

Next we have two new PAVE PAWS being procured. We have two existing PAVE PAWS; one is in the northeast and one in the northwest. We will put one new radar in the southeast and one in the southwest section of the United States.

We have an [deleted] program. Satellite No. 14 will be delivered in [deleted].

We are operating the ballistic missile early warning radars. We are putting a new phased array in at Thule.

The MILSTAR satellite is in full-scale engineering development, first launch in [deleted].

We have AFSATCOM terminals being upgraded. We have the first DISC III on orbit and operating.

Integrated Operational Nuclear Detection Systems [IONDS] are on contract. We will have full operational capability in [deleted].

NUCLEAR WEAPONS MASTER PLAN, PHASE II

We recently completed an important document that was sent to the President called "The Nuclear Weapons Master Plan, Phase II". I would like to share with you some results of that.

As you recall, back in August 1981 there was a Strategic Connectivity Review completed at the request of the President. In October he [deleted] announced the Strategic Force Modernization Program, a five-part program.

At the same time we did a review of all our reconnaissance systems. In October 1983 we submitted to the President a Nuclear Weapons Plan [NWMP], phase II report. The way we handled this mission, and this is why I want to share it with you, we have really tried now to dissect strategic policy and break it down into various initiatives. We call it level A, B, C, and D.

We have done this for both C^3 and I.

Level A, you have a capability in your system to do initial response against [deleted]. You add additional equipment capability with each additional level.

With level B capability you can do a better job [deleted]. You have further capability in both C^3 and I. In level C you can [deleted].

Level D is required to [deleted] in level D.

What we did then is start to design systems looking at what it would take to go from level A through D.

In level A in the [deleted]. Level D has significant resource implications and heavy technical demands for survivability and system performance.

Each level has capability to terminate conflict, counter orders, the capability to bring the system to a halt under control, if you had to.

Now, the aspects of the analysis are fairly key. [Deleted] turned out to be extremely critical to force effectiveness, both [deleted].

Support of C^3I are critical to force effectiveness. you can reduce weapons requirements or improve the use of weapons you have and it has impact on your policy as a result.

The supporting C^3I infrastructure has turned out to be extremely critical.

Specifically, and this is a very sensitive assessment of the program [deleted].

The JCS ran the force analysis, they ran the case for a perfect C^3I. They ran the case with a degraded C^3I. It makes a significant difference in how well the forces actually target and execute the policy.

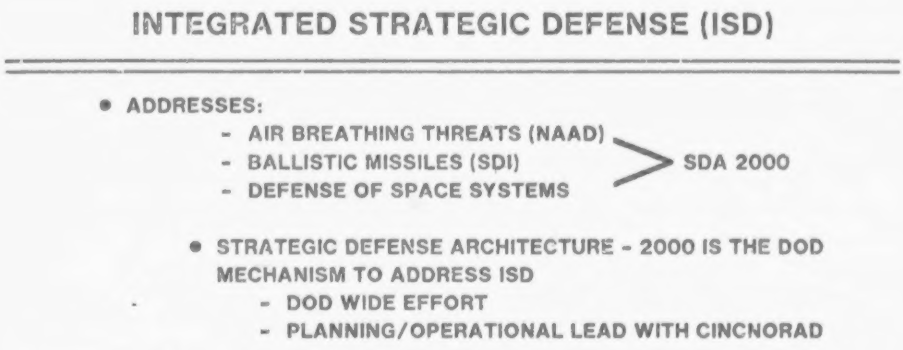
Specifically, in the C^3 result we actually have [deleted].

All [deleted] of those are in early concept definition paper analyses. If you take these [deleted] initiatives out and set them aside for a minute, the money that we have in the 1985–89 C^3 almost gets to [deleted].

We also show you have to have an [deleted]. Very critical.

STRATEGIC DEFENSE INITIATIVE [SDI]

Now, we turn to the Strategic Defense Initiative [SDI] and describe where we are going there because there is a great deal of C^3 work in that.



INTEGRATED STRATEGIC DEFENSE (ISD)

- ADDRESSES:
  - AIR BREATHING THREATS (NAAD)
  - BALLISTIC MISSILES (SDI)
  - DEFENSE OF SPACE SYSTEMS

  > SDA 2000

- STRATEGIC DEFENSE ARCHITECTURE - 2000 IS THE DOD MECHANISM TO ADDRESS ISD
  - DOD WIDE EFFORT
  - PLANNING/OPERATIONAL LEAD WITH CINCNORAD

First of all, we are trying to address air-breathing and ballistic missiles in defense, an integrated defense package SDA-2000. It is a DOD-wide effort. NORAD is taking the planning and operational lead on this program.

Battle Management: A Definition

Battle management is that set of coordination, assessment, decision and direction functions necessary to effectively employ weapons systems.

The function set includes: defense activation, dynamic battle space management, attack assessment, defense strategy/tactics selection and adaptive modification, kill assessment, subsystem status, and system standdown.

I want to define what we mean by battle management in SDI. It spans the range from defense activation to system shutdown. These are a very important set of C^3I initiatives and include the attack assessments and targeting with these various new space sensor systems.

SDI BATTLE MANAGEMENT CHALLENGES

"IFF," early weapon system release to fire, flexible engagement control, high capacity space-based comms/ADP, system performance under stress, survivability, endurance, performance, and how to exercise/test the system.

Specifically, some of the challenges we have in this SDI area are to do an IFF function, permit early release of the weapons, very flexible engagement control, very high-capacity communications that can survive in space, and do all this under stress with nuclear weapons perhaps going off. How to exercise and test the system in peacetime is a major challenge.

STRATEGIC DEFENSE INITIATIVE/BATTLE MANAGEMENT AND C^3

Program description: develop SDI battle management and C^3 system concepts and technologies for multi-tiered ballistic missile defense.

Major technology emphasis: reliable fault tolerant processing, high confidence, verifiable software, weapons release and ordnance safety, robust, secure communications networks, responsive threat interpretation and modeling, and system performance modeling and simulation.

If you look at where we are going in this battle management and C^3 area, we are trying to develop a battle management system concept and integrate the technologies that will support that for so-called multitiered ballistic missile defense.

The major technology emphasis is shown here, high power computers, high confidence in software, new communications system and ability to simulate and monitor this kind of defense.

If you look in a cartoonish way at what we are talking about, here is the boost phase tracking sensor system that looks at the missiles when they first lift off.

Here is another [deleted] system that looks at the post-boost phase.

An airborne surveillance and discrimination system here and a terminal radar system. What you are talking about are the functions of Surveillance, Acquisition, Tracking and Kill Assessment [SATKA] with a whole series of new sensor programs that take you from boost phase all the way into the terminal phase. [Deleted.]

The key technologies to support all of that are over here. We have to get a much better threat data base. [Deleted.]

The challenge is enormous. [Deleted.]

The budget for the systems analysis and battle management is noted here. For 1985 the SDI budget for systems analysis is [deleted] and for battle management C^3 supporting technology, about [deleted] in round numbers there broken out as noted.

For the surveillance, acquisition, tracking and kill assessment, here are technology development items. This totals [deleted] for which most of this money was already in the President's planned fiscal year 1985 expenditures.

We actually reduced it slightly and grouped this in this program element as shown here.

NORTH WARNING SYSTEM [NWS]

Now, let me turn to this North Warning System problem.

We are looking at a set of objectives for North American air space survillance that includes upgrades to the northern surveillance network called the DEW line.

OTH-B, Over The Horizon back-scatter radar, one for the east, one for the west, and one looking south. About [deleted] squadrons of new F-15's for air defense and an antisatellite system with [deleted].

We are looking at studies as to how to get an effective ballistic-missile defense. These go together.

NORTH WARNING MISSION

Provide: tactical early warning of air breathing threat over polar routes, the NCA with time for decisions and survival actions, time to initiate strategic air defense measures, and warning to permit the launch of offensive and C^3 aircraft for survival.

The North Warning mission is to do the following: Provide tactical early warning of air-breathing threat over the Polar route against both bombers and cruise missiles. This provides the NCA time for survival and time for decisions such as to initiate a launch for survival of the bomber force if necessary. Strategic air defense measures provide warning to permit survival of very key elements of our strategic systems and C^{3}I. [Slide deleted.]

[Deleted.]

If you look at what we are requiring here, we want detection of bombers and cruise missile including SLCM, [deleted] and then have some weather and air traffic identification, emergency radio support at each of the sites.

NORTH WARNING SYSTEM [NWS] PROGRAM DESCRIPTION

Components: 13 long-range radars—minimally attended, TBD number of short-range radars—unattended, 4 logistics support stations, and satellite comm to ROCCs.

Cruise missile detection: at side angles, and growth capability.

The way this is going to be put together—we are going out in [deleted] to procure the first [deleted] of 13 long-range radars—they are already developed radars, they are off the shelf—and eventually buy a TBD number of new short-range radars.

Four logistics support stations, satellite communication to ROCCs. [Deleted.]

The dollars we are talking about here are approximately $230 million in fiscal 1985 for the total program at this point. As I say, we will go out on development of the short-range and procurement long-range radars in [deleted].

OVER THE HORIZON RADARS

Here is the OTH back-scatter radars, one looking east, one looking west and one looking south. The east coast site, we funded the initial 60-degree sector in prior fiscal years.

The fiscal 1985 request asks for money to fill out these other sectors so that we can have [deleted].

Within this yellow band we have reasonably high confidence we can detect [deleted].

[Deleted.]

If you look at the radar cross section of cruise missiles [deleted].

What we are requesting for the over the horizon back-scatter radar in fiscal 1985 is around $300 million. The bulk of it is procurement to buy the additional sectors.

TACAMO [EC-130]

Provides the most survivable communications link to our SSBN fleet.
Uses modified C-130 aircraft.
[Deleted.]
EC-130 airframes to be replaced by E-6A.

E-6A

Let me turn to the last viewgraph, the E-6A. As you know, we have a fleet of EC-130 modified aircraft. This is the most survivable relay from shore based facilities to the aircraft to the submarines at sea. The aircraft are [deleted] alone just due to aircraft wear-out.

Senator WARNER. Do you have any input into this decision to replace the E-6 aircraft?

Mr. LATHAM. Yes, sir.

Senator WARNER. We are trying in the Senate to determine what happened. We were under the impression we were going to begin to get replacements this year.

Mr. LATHAM. Let me show you what we are trying to do, sir.

Senator WARNER. Who is "we"?

Mr. LATHAM. Myself, Admiral Nagler, the Secretary of the Navy and Dr. DeLauer, and so on.

Let me try to explain what has happened on E-6A and where the money is or isn't in this program.

Senator WARNER. You use the editorial "we." There must be some difference in view in the building, otherwise, you would be over here with a budget request.

Mr. LATHAM. What happened is that during the POM 1985 build and the discussions with the Defense Resources Board [DRB] there was a decision made to cover the amount of money that appeared to be short in the Navy shipbuilding account, money which was put into that and not into the E-6A at that particular time.

The President's budget came over with $77 million in RDT&E.

Admiral NAGLER. During the DRB deliberations for POM 1985 the Secretary of Defense staff felt that the shipbuilding account was underfunded.

The Secretary of the Navy, Mr. Lehman, did not agree with that. He thought it was properly funded.

The staff of PA&E then recommended that the money come out of E-6. The Secretary reluctantly went along with that.

Since that time the Secretary has gone back to the Secretary of Defense and said, "We now believe we have proven that the SCN account is not underfunded and we request that you take $187 million out of the SCN account and put it in the APN account to procure the E-6 in 1985.

Senator WARNER. I accept your representation. That will be in the record.

Admiral NAGLER. Thank you. As you know, all Secretaries of the Navy have always been very distinguished.

Senator WARNER. Which office are you running for?

[Laughter.]

Admiral NAGLER. City Council of Virginia Beach.

Senator WARNER. The likelihood of Congress putting any add-ons is quite remote. It seems to me that this program is essential from the standpoint of the safety of the men and women that are flying them.

Mr. LATHAM. We told some of the people in the Controller's office they could go down to Patuxent and fly them. They were reluctant.

Admiral NAGLER. The E-6 can land at [deleted] bases and does not have to operate out or [deleted] where they can be [deleted] as the EC-130 does.

All the rhetoric aside and any argument, what happens in communication improvements 15 years from now never seems to materialize as well as we claim they will come about. The survivability of TACAMO is the key issue in this whole argument.

C^{3}I MODERNIZATION

A C^{3}I ASSESSMENT

Priority recognized: defense guidance of SECDEF, by the President, by budget request.

Modernization program defined/underway: to increase survivability/endurance, improve connectivity, integrated with forces package.

A survivable and enduring C^{3}I system will: strengthen deterrence, provide stability and escalation control, permit tradeoffs for additional weapons.

A C^{3}I countermeasures capability is required.

The initiatives to "fix" problems are: not all that simple, will take time, will require sustained support.

Let me turn to the last viewgraph.

The modernization program is underway and in the current budget drill that is going on in the building, in the strategic program is not supposed to be touched.

However, as you heard, the E-6 was touched last summer. We are working on some C^{3}I countermeasures. Important is that the initiatives that fix all these problems are not going to be accomplished overnight. It is going to take a while to do all of this.

[The prepared statement of Mr. Latham follows:]

PREPARED STATEMENT BY DONALD C. LATHAM, DEPUTY UNDER SECRETARY OF DEFENSE (COMMUNICATIONS, COMMAND, CONTROL AND INTELLIGENCE)

I. INTRODUCTION

Good morning gentlemen. I thank you for the opportunity to discuss with you what I believe to be a critical component of our strategic military capability—namely, strategic communications, command, and control, or C^3.

Today we have an aggregation of programs called Communications, Command, Control, and Intelligence (C^{3}I) which I oversee as the focal point in the Office of the Secretary of Defense. The portion I am here to address this morning is the Strategic C^3 area of my responsibility. In FY 1985, the budget request for strategic C^3 programs is $4.5 billion, an increase of only $0.1 billion over the FY 1984 appropriation.

My presentation today will highlight the very substantial progress we have made in implementing the C^3 portion of the Stratetic Forces Modernization Program. It will also address the FY 1985 and outyear programs which are being undertaken to reinforce the capabilities of our strategic C^3 system. This system is the vital capability which assures that our strategic forces can be used when they are needed; it provides the capability for the National Command Authorities [NCA], senior military commanders and subordinate force commanders to direct and manage the strategic forces in peace and in war in support of the highest priority mission of the Department of Defense and in accordance with national policy and defense strategy for employment of these forces. That policy requires assured survivability and enduring capability of strategic C^3. A surviving and enduring C^3 system enhances our deterrent posture and provides for a more stable deterrent. For a credible deterrent, the strategic C^3 system must of itself be absolutely credible because its purpose is to support and enable implementation of the gravest decisions that any President may ever have to make. The system must retain that credibility under the most severe stresses imaginable, and it must retain the capability to implement force employment decisions—made in accordance with national security policy—under those stresses for perhaps extended periods of time.

ESSENTIAL STRATEGIC C^3 FUNCTIONS

To effect the most efficient management of the strategic C^3 portion of the President's modernization program, we have grouped the C^3 functions into Mission Areas (MAs). Each MA consists of a group of programs mutually dedicated to address specific strategic C^3 objectives. The following three key areas are required to support our strategic deterrent policy and, if deterrence fails, to bridge the transition from peace to war. I will discuss the individual programs in more detail during the hearing today.

Tactical Warning and Attack Assessment [TW/AA]—which provides the unambiguous basis for determining that an attack has been initiated, including characterization of the attack in terms of its origin, composition and general objectives.

Command Decision Making—to take such actions as are needed and possible to prevent the forces from being destroyed before they can be employed, or to employ some or all of our forces in accordance with national policy.

Communications—to convey tactical warning information to the decision makers for use by the NCA in conference with his senior military advisors in support of prompt response and force-survival decisions; for conveying orders to carry out such decisions to the forces; for reporting the results of these actions to decision makers and force commanders to form the basis for subsequent actions; and, in particular, to control escalation of the conflict and to bring the hostilities to a rapid termination on terms favorable to the United States.

During the transition phase, the strategic C^3 system will be subject to severe stresses, including destruction of facilities, deliberate attempts to disrupt communications and senior functions by jamming and wide-ranging effects of high-altitude and surface nuclear detonations. As matters stand today, the central functions—(warning, conferencing, and decision making) must be accomplished [deleted] if not, the capability to use the strategic forces in response to the attack, immediately or later, may be seriously degraded. Thus, an overall requirement of highest priority, even if force endurance is enhanced, is to assure to the greatest extent possible that these central functions can indeed be accomplished [deleted] and that we build endurance into the supporting C^3 to permit such support over an extended period after a first strike by the Soviet Union. The most difficult problem is to assure that adequate connectivity between the warning system and the NCA and between the NCA and the strategic forces is preserved, at least through the crucial decision-making phase of the transition.

The programs I will describe today are the result of several indepth analyses of the capability of the strategic C^3 system to function during the transition to war, of the critical deficiencies in our current operational posture and the addressal of the C^3 system-weapon mix as a unified element. The initial analysis preceded the development of the Strategic Forces Modernization Program and was one of the key determinants which led to President Reagan's listing of strategic C^3 as the most important element of the modernization program. We are in the process of redressing those deficiencies. To assure that our established goals remain realistic and the component elements of the program are developed in a coordinated and time-phased manner, continued high-level attention is required. We, therefore, are continuing our strategic C^3 review process in concert with nuclear weapons planning to provide an authoritative basis for program surveillance and guidance.

TACTICAL WARNING AND ATTACK ASSESSMENT

In the tactical warning area we subdivide programs into those directed toward the ballistic missile threat and those associated with the atmospheric threat. In the ballistic missile surveillance and warning area, we are on contract for procurement of two additional PAVE PAWS radars which will eliminate gaps in our present coverage of submarine-launched ballistic missiles [SLBM] areas in the southeast and southwest sectors of CONUS. The northeast and northwest sites are fully operational. Our outyear programs will provide for pre-planned upgrades of the PAVE PAWS radars. The southeast radar pre-planned improvement will have a greater target detection capability than the other PAVE PAW radars, permitting it to perform a secondary mission of space surveillance. This will permit us to shut down the aging FPS-85 radar, which presently provides essential space-track data. The PAVE PAWS radars provide one of the two independent types of observation means required for the SLBM detection and warning function. The Missile Impact Prediction [MIP] computer replacements at the three Ballistic Missile Early Warning System [BMEWS] sites have been completed. The new computers are currently undergoing in-place operational testing [deleted]. The Thule BMEWS radar upgrade contract was awarded and work is now on-going to replace the antiquated ultra-high frequency [UHF] detection and tracking radars, with a new UHF phased-array radar based heavily on PAVE PAWS design components. The upgrade will significantly enhance the quality and detail of missile warning information available for decisionmaking in the event of a nuclear attack.

In the second tactical warning and attack assessment phenomenology means, based upon infrared detection of missiles, we are acquiring [deleted]. The on-going acquisition of six mobile ground terminals [MGTs] to serve as an austere backup capable of processing the [deleted] satellite data and to provide a direct readout of warning information to the users will complement the satellite improvements. These [deleted] improvements will provide a more assured availability of early warning information in a timeframe which will permit execution of force survival actions in the event of a ballistic missile attack.

We have also begun acquisition of nuclear event sensors for deployment on NAVSTAR Global Positioning System [GPS] satellites to accurately locate and characterize nuclear detonations in near real time on a worldwide basis. This system, known as the Integrated Operational NUDETS Detection System [IONDS], will permit assessment of damage we have sustained and the effects of our retaliatory strikes, [deleted].

In the atmospheric threat surveillance area, we will initiate the acquisition of new long-range radars [LRRs] [deleted] to begin the upgrade of the existing Distant Early Warning (DEW) Line, and we will complete their acquisition in FY [deleted] the new long-range radars, which were first acquired and proven in the Alaska SEEK IGLOO program, will require minimal manning and have improved reliability, supportability and performance relative to the vintage 1950's radars that are in current use. Development of complementary short-range radars [SRRs] to [deleted]. Substantial reductions in DEW operating costs are expected because of unattended SRR operation, minimal manning at LRR sites and the use of more reliable equipments. The DEW Line upgrade, together with the new Over-The-Horizon Backscatter [OTH-B] radars planned for the East, West and Southern U.S., will provide complete contiguous surveillance coverage of all air-breathing approaches to North America and assure timely warning of bomber or cruise missile attacks on North America. The OTH-B radars provide all-altitude coverage for bomber aircraft out to [deleted] nautical miles and increase the warning time available for survival of retaliatory forces and provides decision time for National Command Authorities consistent with missile warning requirements. Detection and tracking of air-and sea-launched cruise missiles is also being addressed in the OTH-B program and by other sensor approaches. We will conduct tests of the OTH-B radar to enhance our understanding of small target and cruise missile detection.

We are continuing the effort to upgrade the previously proven experimental radar system [ERS] in Maine to a fully operational OTH-B configuration as the first East Coast 60-degree sector. The second East Coast sector was funded for procurement in FY 1984 and our FY 1985 procurement program will complete the East Coast system and acquire the first West Coast sector.

The budget request contains [deleted]; $489 million other appropriations).

COMMAND DECISIONMAKING

In the command and control decisionmaking area, we are upgrading the survivability and capability of command centers that would direct U.S. strategic forces during a nuclear war. We have recently completed the move of the E-4B National Emergency Airborne Command Post [NEACP], which serves the National Command Authority in the event of war, to inland alert bases for increased warning time in the event of Submarine-Launched Ballistic Missile [SLBM] attack. The final E-4B aircraft (for a total of four) which has completed the electromagnetic pulse [EMP] hardening program will be delivered in [deleted]. We have provided EMP-protected facilities for strategic C^3 equipments at selected command posts and are continuing to do so at SAC Aircraft Wing Command Posts. At the Alternate National Military Command Center [ANMCC] we are upgrading our electrical power capability and providing additional communications assets. Our programs to improve the communications capability and survivability of the EC-135 airborne command posts serving military commanders will continue.

The budget request contains [deleted] million for the Command Decision Making Mission Area. [Deleted] other appropriations.)

COMMUNICATIONS CONNECTIVITY

Our strategic communications programs are structured to provide improved communications between sensor sites, command locations (including the NCA) and nuclear capable forces. Improvements and new acquisitions will emphasize survivability and endurability.

In the satellite communications [SATCOM] area, we are continuing to make improvements in the quantity, quality and cost effectiveness of our programs. We expect to launch the first two UHF LEASAT satellites this year and two additional satellites in 1985. These satellites, combined with the four Fleet Satellite Communications (FLTSATCOM) satellites now on orbit, will substantially increase our on-orbit capability for UHF SATCOM systems. Our FLTSATCOM satellites [deleted] respectively. Satellites seven and eight will have a MILSTAR-like extremely High Frequency [EHF] package on board in addition to the normal UHF capability as an interim measure for MILSTAR EHF terminal testing until MILSTAR is available in [deleted]. In addition, we are continuing the development of the MILSTAR satellite system and terminal systems at a rapid pace with the first satellite launch scheduled for late [deleted]. This program will provide a highly enduring and jam-resistant satellite space segment for two-way connectivity to the strategic and tactical forces. For the Defense Satellite Communications System [DSCS], we have an operational DSCS III satellite on Orbit, a second is scheduled for launch later this year (with the last DSCS-II), and we are ready to implement a multi-year procurement program for the acquisition of the remaining seven DSCS III satellites. This multiyear approach will save approximately $176 million in procurement costs from 1984 through 1989. These new satellites will provide increased survivability, capacity, improved jamming protection and improved autonomy with less dependence on the single Satellite Control Facility [SCF] located at Sunnyvale, California.

In the area of strategic ground based communications we are continuing to implement the communications improvements identified in the forces modernization program. [Deleted.] We are now on contract for implementing the second phase of GWEN. This system will operate at low frequency and connect major command locations, sensor sites, strategic bomber bases, missile launch control centers, and strategic defense sites. The system will have sufficient relay node proliferation to provide high assurance of EMP-protected austere backbone communications connectivity for support of the missile warning, emergency action message dissemination functions and subsequent support of force reconstitution and recovery operations after a nuclear attack.

The SAC Digital Information Network [SACDIN], which will provide automatic CINCSAC and SAC SIOP Force connectivity, is currently undergoing testing and evaluation. Completion of this much-needed program will alleviate the significant deficiencies in the responsiveness and maintainability of the aging, limited-capability SAC data transmission subsystem. The contract for production of the total network will be awarded this summer.

The development and acquisition of an austere Extremely Low Frequency [ELF] Communications system to enhance survivability of our Fleet Ballistic Missile (FBM) force has been slowed dramatically by a recent court injunction related to environmental impact. [Deleted.] Our lawyers are actively working this issue to permit a restart of those activities which have been stopped.

The Fleet Ballistic Missile [FBM] submarine force is the most survivable leg of the strategic triad today. With the deployment of the Trident weapons system, the expanded airborne communications requirement [deleted] itself, but also means that there is [deleted]. The E-6A will correct these problems. It will have the necessary range, speed and endurance to support the connectivity requirements [deleted]. We are currently on contract for the development phase of this critical program and need to begin funding the production phase now to insure that we can provide connectivity to mesh with TRIDENT deployments. The E-6A is an absolutely vital component of our strategic C^3 program.

[Deleted.]

CONCLUSION

A comprehensive and integrated strategic C^3 program is an absolute necessity to implement any plan for revitalizing our strategic deterrent posture regardless of the composition and quality of our strategic forces. The C^3 program must be implemented as a complement with the forces modernization efforts.

We must be able to accurately sense and estimate the specific objectives of an attack, communicate with our forces prior to, during and after an attack, and retain the ability to direct our strategic forces in a counterthrust, the strength of which could be so unacceptably high to the Soviets, that they will be deterred from ever initiating an attack.

The program highlights presented above illustrate our progress in implementing the strategic C^3 portion of President Reagan's Forces Modernization Program first announced in 1981, and supported by the Congress in response to our prior-year budget requests. Our on-going efforts have continued to build upon and refine that modernization program to achieve a strategic C^3 system which meets national policy and defense strategy requirements. This will require continued dedication and intense efforts by all three of the services, major defense resource commitments, and the continued support of the Congress.

Mr. Chairman, this concludes my remarks. I would be happy to answer any questions you or the committee might have.

Senator **WARNER**. I think that is an encouraging report that you have provided us.

Now, what is the desired order in which you would like to have your supporting witnesses address these issues?

Mr. **LATHAM**. Any way you want to do it, sir.

Senator **WARNER**. Would each of you like to make some opening comments?

General **PRATHER**. I can't add anything further to what Mr. Latham has said.

Senator **WARNER**. Admiral Nagler?

ELF

Admiral **NAGLER**. I have submitted a classified statement. Since Mr. Latham has eloquently addressed this, I would like to mention one minor thing—the subject of ELF in Michigan and Wisconsin.

As you know, the Federal judge, Judge Crabbe, upheld an injunction against the U.S. Navy prohibiting any further construction in Wisconsin or Michigan until an additional environmental impact statement is submitted by the Navy. That we are working on.

What really concerned me about the judge's decision was that she also prohibited any installation of ELF receivers on submarines. I think that is a type of decision that concerns us because it could be extended in other areas to prohibit other installations on tanks or ships or aircraft.

We are appealing that decision and we expect the judge to make the decision any day now. We have been expecting that for a week.

We are very concerned that it is destroying one of the President's initiatives. We have discussed this for 20 years. We think we have proven that the ELF is environmentally safe and needed.

Senator WARNER. Admiral, both you and I have worked together on this program for a long time. It will take great patience and persistence, but we will eventually get it done.

Admiral NAGLER. That is all I have, sir.

Senator WARNER. Is the judge aware that the Soviets [deleted]. Is the judge looking at all at the strategic implications of this issue?

Admiral NAGLER. I don't believe so, I have not talked to the judge, myself. My estimate from reading testimony and talking to the people who did testify is that she is just addressing what she perceives is the law.

I do have a picture [deleted], if you would like to see it. Maybe you have already seen it.

Senator WARNER. By the way, did you have an opportunity to see that article in the Washington Times of the Soviet submarine operating in a tunnel system?

Admiral NAGLER. You are talking about the collision?

Senator WARNER. No.

Admiral NAGLER. [Deleted.]

Senator WARNER. Yes.

Admiral NAGLER. I saw that article.

Senator WARNER. Are we at liberty to discuss that [deleted]?

Admiral NAGLER. [Deleted.]

Senator WARNER. Secretary Latham, do you have any knowledge?

Mr. LATHAM. [Deleted.]

[Deleted.]

I have nothing else, Mr. Chairman, unless you have some questions.

Senator WARNER. General Rockwell?

General ROCKWELL. I have no statement, Mr. Chairman.

Senator WARNER. We have some questions to propound.

Mr. Secretary, could you go into greater detail on the issue of [deleted].

Mr. LATHAM. Yes, sir, I will try to do that. As part of the development of the nuclear weapons master plan analysis, the DIA did an extensive study, which is still going on and being updated even further, to try to identify [deleted].

Their estimate is that there are [deleted].

Senator WARNER. That are [deleted].

Mr. LATHAM. Yes, sir. That can be [deleted] out in the boonies. [Deleted.]

We have under detailed examination techniques to try to [deleted].

It appears to be a very serious problem in that, as you know he is [deleted].

Senator WARNER. That is an interesting observation because this subcommittee received testimony this year about the Soviet emphasis on [deleted].

Mr. LATHAM. They have, for example, [deleted].

They are in effect [deleted].

Senator EXON. Could I ask a question?

Senator WARNER. Go ahead.

Senator EXON. Mr. Secretary, please amplify a little bit on your statement. I think the chairman will agree with me that some of the recent testimony that we have solicited and have been given seems to come as a surprise to those of us here.

Do I understand you to say that the [deleted].

How long has that information been known to you?

Mr. **LATHAM**. [Deleted.]

Senator **EXON**. Since the time that you have known that, Mr. Secretary—I am sure it has been called to the attention of people in the executive branch of the government—has that information, to your knowledge, been made known to the Congress and, if so, in what form?

Mr. **LATHAM**. I can't tell you whether it has been made known to the Congress. Let me tell you it is well documented in a very detailed report by the DIA. There have been extensive briefings by the DIA to numerous groups—I don't know to whom in Congress—about these types of initiatives on the part of the Soviets, including the [deleted] and so on.

I don't know who over here has been told about it.

Senator **EXON**. Have you testified previously on this particular subject to any committees of the Congress.

Mr. **LATHAM**. I haven't testified. I have mentioned it in previous testimony about the [deleted] problem, but I have never come over and given an intelligence briefing.

[Deleted] DIA comes over here once a year at least and gives you a several-hour intelligence briefing on the latest data on Soviet systems from A to Z.

Senator **EXON**. They certainly do that.

The only thing I say, Mr. Chairman and Mr. Secretary, is sometimes maybe we don't ask the right questions, but there have been two or three occasions in the last 2 or 3 weeks that I think this committee has been quite surprised by some of the testimony that we have heard.

I am not saying this in a critical way, but I just say, Mr. Secretary, that while any one of us might miss something that happens, I am quite surprised that at least this committee or some members of this committee and especially this subcommittee continue to be surprised by some of these things that seemingly have been known for years, not months, before they are brought to our attention in a precise manner.

It might be that some of these things come to your attention and CIA and others on a sketchy basis. You know, you have made some pretty precise statements here this morning and I accept them at face value.

CURRENT INTELLIGENCE

Mr. **LATHAM**. One of the things you have to do and it is very time consuming, I have regularly delivered to my office a large volume of [deleted] reports. You just have to take your Saturdays and read them. Some of them are quite thick.

For example, I have a fairly new one in my safe that is an extensive report on what has been done [deleted].

Somebody has to sit down and read that material. It is a lot of work. You find it hidden in various places, in some paragraph that they have this in, and you have to do a lot of reading.

Somebody has to say, "I would like a briefing on that." You listen to the briefing and do a lot of reading. Probably those reports don't get sent over here. Not that you can't have them, but it is just that you are not on the normal distribution point.

Senator EXON. I would like to interrupt you.

I am sure with all the reading we have to do we can't be abreast of all these things, but maybe we are pointing up here, Mr. Chairman, that we need better communications at some level. I certainly don't have time to read all these things.

I have staff people who are cleared who can do it, but more importantly, I guess the point I am making is that when things of this potential alarming nature come to your attention, as they should, you should feel free to come over and see the chairman of this subcommittee or any of the members of the Armed Services Committee regardless of our subcommittee assignments and bring it to our attention.

I wish maybe we could improve our flow of communications.

I don't believe you intended to withhold anything from us, but there is a breakdown in communications somewhere, Mr. Chairman.

Mr. LATHAM. For example, we have a weekly [deleted] briefing. I will try to get them flagged and get the information over to you.

Senator WARNER. We would appreciate that. We recognize that while your charter in the Pentagon is across a very broad base, that type of emphasis should be applied by other witnesses as they appear before this subcommittee.

I share Senator Exon's view. It seems to me while this record may reflect some information on this subject, the emphasis this year has been considerably greater than in past years.

I know it has caused me deep concern about this shift to greater and greater [deleted].

Mr. LATHAM. It is a similar story [deleted].

Senator WARNER. The ruble investment in this program is enormous.

SOVIET SPACE SYSTEMS

Mr. Secretary, what is your assessment of the current and projected Soviet capability to use their space-base assets [deleted]?

Mr. LATHAM. They have today, as you know, [deleted].

Senator WARNER. As they proceed to develop their manned space program, the addition of human beings on a permanent basis in space, how does that add to their capability to provide [deleted].

It may well be that the subject is above the classification level under which we are operating. I want the record to reflect that the chairman is interested in this subject and I am sure my colleague is likewise.

Mr. LATHAM. [Deleted.]

I believe Admiral Nagler would like to comment on the [deleted].

Admiral NAGLER. [Deleted.]

Senator **Warner**. General Rockwell, have we given you an opportunity to address the committee?

General **Rockwell**. Yes, sir, you have. I have no statement to make in this subject area.

Senator **Warner**. I just wanted to make sure.

NAVSTAR/GPS

General Prather, recognizing that the Air Force intends to comply with current law relating to NAVSTAR GPS user charges, could you outline any concerns you have about this requirement?

General **Prather**. As you know, Mr. Chairman, the Air Force position is that we would be willing to take direction from Congress and to implement, if necessary.

Our view is that it would be very expensive to implement that process.

Senator **Warner**. Would you speak up a little bit, please.

General **Prather**. The Air Force believes it would be very expensive administratively to work that implementation of the fee process. We have no strong feelings in the Air Force that the fee should or should not be charged.

At this point we yield to the Department of Defense to make a decision.

Mr. **Latham**. As you know, as a result of the KAL-007 shoot down, there has been quite a bit of interest in whether or not we should do away with the civil user charges.

The FAA has been saying they would like to have them stricken from the law, so to speak, for any civil area.

To support what General Prather says, it turns out that trying to implement the user charge in the civil world is like trying to sell license plates worldwide every year. It is very difficult to administer.

The only way we felt we could administer it would be to put some sort of security device on each of the terminals and update the security device every year.

It is a very complicated thing and the amount of money you get back might be minuscule after the administrative expense.

On the military side we could handle the user charges by the R&D recoupment process and not charge our allies so many dollars a year for each of the terminals.

Basically what we would like to do is do away with user charges in total.

Senator **Warner**. It seems to me your approach is a pragmatic one.

Is there concern about the [deleted] capability in providing for a user charge mechanism?

Mr. **Latham**. Yes, there is. That is a key factor. [Deleted.]

Even on the allied military side there is some concern as to how we could.

SPACE WARFARE

Senator **Warner**. The subcommittee has received startling information regarding current and projected Soviet space warfare capabilities.

Advise us in general how our strategic C^3 system will cope with these threats.

Mr. LATHAM. I wish I knew what somebody had told you. I don't know how to quantify an answer to that. There has been a lot of publicity on Soviet ASAT. I think there are means around that particular weapon system.

The Soviets have a very aggressive directed energy, high energy laser program. [Deleted.]

I worry more about Soviet attempts to defend and degrade our systems with [deleted]. He appears to pay a lot of attention to that.

Senator WARNER. Mr. Secretary, how concerned are you about Soviet capability to use their [deleted].

Mr. LATHAM. [Deleted.]

Senator WARNER. What about the ground-based laser?

Mr. LATHAM. [Deleted.]

ENDURING C^3

Senator WARNER. Can you tell us which of the programs you described are intended to provide endurance for the strategic C^3 system that might extend beyond the dissemination of the original emergency action message?

Mr. LATHAM. Yes, GWEN is one that we certainly believe will survive for extended periods of time against both physical attack and jamming and could have long-term endurance if it has a large number of nodes. It has a switching technique so if a node is out, you can route around it.

There is more endurance than the advertised [deleted].

We are embarked on Mobile Command Center Programs with the same complementary idea that you could have extended survivability [deleted] against jamming and so on by one or more of those techniques.

As to the communications area in space, I believe we would expect MILSTAR to survive and endure for an extended period of time [deleted].

We are taking measures to make MILSTAR a very survivable system. There is high confidence we can do that.

Also, the Global Positioning System [GPS] I believe has extended survivability. [Deleted.]

There are a number of components that I think will survive. [Deleted.]

Senator EXON. Gentlemen, I am sorry I came in late.

Senator WARNER. Gentlemen, thank you for your promptness this morning and a very thorough briefing.

I will defer to my partner here to continue the hearing and terminate it.

SOVIET HARDENED FACILITIES

Senator EXON [presiding]. If you could back that up and show me briefly the information that you showed earlier on the [deleted].

As I understand it, you showed something indicating that [deleted].

While you are preparing for that, let me explore the ELF situation with you a bit. As one Senator, I am very concerned about our getting tied up in Court on the matter of proceeding with our ELF program which I think is critically important as we face the future.

ELF

Mr. Secretary, is there anything at all that members of this committee could do to hasten that or is it strictly a legal matter that has to take its time to work itself out?

Mr. **LATHAM**. Let me ask Admiral Nagler to answer that question. I believe it is a legal matter.

Admiral **NAGLER**. I think we can have an amendment to the congressional bill that will allow us to go ahead with ELF. I would be more than happy to pursue that if you so desire.

Senator **EXON**. Admiral, I think, and I am sure the chairman would concur with me, if there is anything we can do to move that program along, we would be happy to do it.

So, if we could work with you and your experts and the committee staff in preparing some kind of amendment, at least speaking for myself, I very much would like to do so because I really believe if there is anything we can do congressionally to speed that process along, then I believe we should have the courage to bite the bullet and go ahead and get it done.

Can I rely on you and the members of the majority and minority staff here to get into this particular situation because I think it is critically important?

Admiral **NAGLER**. I appreciate that, Senator. I will certainly do that.

I am very concerned about the precedent which has been set that we cannot install ELF receivers on submarines.

Senator **EXON**. Also, would you just briefly tell me, without going back to the slide, about the [deleted] program? Are they moving along on that?

Mr. **LATHAM**. Yes, sir, [deleted].

Senator **EXON**. Do I take it by that that they are on a par with us on [deleted] technology? Considering the Soviet Union vis-a-vis the United States, are we ahead in research and development or are they ahead, in your opinion, and operationally where are we?

Mr. **LATHAM**. The [deleted] technology has been underway for many years. [Deleted.]

There have been a lot of unclassified papers written, and so on. Whatever we have I would assume they have knowledge of.

So, we are probably on a par. I would have to look into some of the details on it and take that for the record.

ALLIED ELF

Senator **EXON**. How about the allies, the British and the French? Do they have such a communications system with their submarines?

Mr. **LATHAM**. No, sir, they do not.

Admiral **NAGLER**. Both the British and the French are interested in such an ELF system and have come to us for technology exchange.

My guess is that they would like to use ours after we get it built. [Deleted.]

Senator Exon. I guess what you are saying is that if we can get our system built, it could be used also and be adapted to communicate with the French and the British submarines.

Admiral Nagler. Yes, sir, it could be or they might be interested in their own system. I don't know at this point.

[Deleted.]

Senator Exon. Thank you.

Could you go ahead.

SOVIET HARDENED FACILITIES

Mr. Latham. [Deleted.]

Senator Exon. Let me interrupt you. We hear continually about the [deleted] and so forth and so on.

[Deleted.]

Mr. Latham. [Deleted.] There is a whole briefing on this that we could have brought over here.

Senator Exon. I get the picture.

Just one last question to broaden my view and understanding of this a little bit.

We have received testimony on some of their anti-satellite technology. I heard you say that we are working on various hardening devices.

SATELLITE HARDENING

Do I assume correctly that that would be on follow-on satellites that we put up?

There is no way we can harden satellites already there; is that correct?

Mr. Latham. No, sir, we cannot.

Senator Exon. Our hardening would be on the follow-ons?

Mr. Latham. We have satellites now that have been hardened in their design against certain nuclear effects. The FLTSAT, of which we have four up and operating today, and we have three more on procurement, are hardened against electromagnetic pulse, also DSCS–III satellites and that is also true of some other systems.

[Deleted.] We will be taking appropriate hardening measures as the threat evolves.

Senator Exon. This brings me to something that keeps coming into my mind.

All of our planning and programing, whether it is an antisatellite device or going into the new strategic defense initiative program that the President has announced, is based essentially, as I understand it, on satellites operating for command and control purposes?

Mr. Latham. Yes, sir.

Senator Exon. If we had the best particle beam weaponry in the world, it wouldn't be effective unless we could tell in advance where the missiles are coming from and where they are headed for.

Mr. Latham. That is correct.

Senator Exon. That brings me back to this situation.

Don't we and the Soviets face a mammoth problem with regard to technology to harden or make our satellites so redundant that they couldn't be taken out?

You know, we always talk about first strike, surprise, sneak attack and those kinds of things. Under our present technology and their present technology, aren't most of those satellites highly vulnerable or fragile from the standpoint of a first strike?

Or, putting it another way, is not the science and technology of destroying satellites likely always to be ahead of the hardening techniques that we and they hope to develop?

Mr. LATHAM. No, sir, I don't think so. It is like the current electromagnetic warfare games you play in the tactical world. There are things you can do to survive space assets in addition to hardening.

For example, on MILSTAR in addition to hardening the satellite against nuclear effects and laser effects, we are going to provide [deleted].

Let us assume you have a sensor system that tells the command and control system that a vehicle of some unknown type has been launched against MILSTAR and we see it in a trajectory heading toward a MILSTAR satellite. We could, [deleted].

Senator EXON. Gentlemen, thank you very much.

We have a rollcall vote on.

I speak for all the members of the subcommittee in saying we appreciate your coming over and testifying this morning. It has been a very interesting and informative session. Thank you very much.

Mr. LATHAM. Thank you, sir.

[The questions submitted by the Senators of the Senate Armed Services Strategic and Theater Nuclear Forces Subcommittee to be answered for the record are as follows:]

QUESTIONS SUBMITTED BY SENATOR JOHN W. WARNER

TACAMO BUDGET REQUEST

Senator WARNER. Admiral Nagler, can you describe for us the improved capabilities for the current TACAMO that are included in the budget request?

Admiral NAGLER. The budget request contains provisions for capabilities improvement in two areas; [deleted]. Enhanced VERDIN and Compact VLF (CVLF) systems provide [deleted] to assure message delivery in the [deleted]. RDT&E efforts are underway to [deleted]. As recommended by the 1983 DOD Authorization Act Conference Report, a Pre-planned Product Improvement (P^3I) to the TACAMO communications suite has been initiated. This will include replacement of [deleted] solid state amplifier, [deleted].

Senator WARNER. When completed, would these change your assessment of TACAMO's current limitations?

Admiral NAGLER. Yes, these improvements would eliminate many of the [deleted] of the existing communications equipment as they effect connectivity. The EC-130 airframe would still [deleted] achievable in the Pacific because [deleted]. This [deleted] because of the area in which TACAMO must fly to meet JCS directed connectivity to the SSBN [deleted] growth potential, and reliability are still [deleted] constraining the EC-130 airframe in execution of TACAMO's mission. Allowing TACAMO to exist with the EC-130 airframe will [deleted] the system and not tolerate any [deleted] is essential. We should not be lulled into believing that we have found a cheaper solution to a difficult budget problem that mortgages a future capability. The submarines are the most survivable deterrent and we should not lessen their credibility by acquiring a [deleted].

ENDURING COMMUNICATIONS

Senator WARNER. Admiral Nagler, how much is included in the current budget request for enduring communications?

Admiral **Nagler**. The current budget request includes funding in excess of [deleted] for enduring communications. The three major programs in this category include MILSTAR, GWEN, and E-6A.

OTH-B

Senator **Warner**. Mr. Latham, what consideration has been given to moving the location of the south-looking OTH-B in order to provide better coverage of coastal waters out to 500 miles from which sea-launched cruise missiles might be launched?

Mr. **Latham**. Originally, the south-looking OTH-B was to be located in the Texas/Oklahoma area; however, in order to meet the sea-launched cruise missile (SLCM) threat, the OTH-B will be located in the north central part of the USA instead. At this location, the OTH-B radar will cover an area from the southern USA coast line (northern edge of radar coverage) over a 1,300 mile area to the south, thereby assuring surveillance over the area where SLCMs might be launched.

BLUE-GREEN LASER COMMUNICATIONS SYSTEM

Senator **Warner**. Mr. Latham, what is the status of the blue-green laser communications research?

Mr. **Latham**. The status of the blue-green laser communications program has changed dramatically in the past year. There have been a number of strong technical and operational advances resulting in major projected performance improvements in the Submarine Laser Communications [SLC] concept. As a result, we feel that there are no longer any unresolved issues about the basic physics of laser communication to submarines, although significant engineering work remains to translate these technologies into a reliable and survivable system. Each of the features actually needed for a real system have now been separately demonstrated in the laboratory.

The effectiveness of a communications system is a summation of the capabilities of the transmitter, the receiver, and an understanding of the physical characteristics of the medium through which the signal is transmitted. Following is a detailed account of the progress in all three areas.

a. We have developed a laboratory test model of the optical filter which will be the front end of a very efficient and narrow band optical receiver.

b. Matched to the fixed, [deleted].

c. Our recent propagation studies also indicate that [deleted]. The improvements could be used: to increase the depth to which we can communicate in a one-way transmission to submarines, to increase the data rate of the system, to reduce the size of the transmitter so that it becomes more compatible with the requirements of space qualification, or some combination of the three. However, engineering all of these subsystems into reliable space hardware will require [deleted].

Senator **Warner**. Does this technology show promise for communicating with submarines at depth, what are its potential problems, and when might it be operational?

Mr. **Latham**. This technology does show promise for communicating with submarines at depth. The remaining technical issues involve engineering these technologies into an [deleted] receiver that will be tested upon a submarine; and into a laser transmitter capable of space-qualification and of serving as an operational space-based submarine laser communications transmitter.

The DARPA program is now narrowing its focus to complete the development of technologies that should enable an effective operational satellite-to-submarine communication system to be in place by [deleted]. The effort is aimed at resolving the final technical issues needed to support a Navy decision in [deleted] to begin development of a system which can communicate to submarines at depth, at any speed, and through thick clouds without interfering with the submarines' operational employment.

Questions Submitted by Senator Carl Levin

ENDURING C^3 PROGRAMS

Senator **Levin**. Assuming that the Soviets make a determined effort to destroy our C^3 assets, how many of the programs which you discuss in your statement will have the capability to last as long as the "extended" period of time you have established as a planning requirement for them?

Mr. Latham. As a consequence of an initial attack, many fixed terrestrial facilities, communications links, and non-alert airborne elements may be destroyed, and Soviet antisatellite weapons might be used to negate some low-altitude space-based elements of the strategic C^3 system. Following the initial attack, major threats to the strategic C^3 system include radioactive fallout which can disable personnel at surviving terrestrial facilities and severe turbulence and dusty clouds from nuclear detonations which can affect airborne elements.

Operational necessity dictates the need to achieve survivability of several critical functions [deleted] during the initial phases of a strategic conflict. Thus many of our systems are being designed to have a [deleted] survivability capability, but one which is adequate for its primary function.

Once the [deleted] has been selected and the associated emergency action messages and force direction have been received by the forces, the job performed by those systems supporting the initial phase is essentially done. The enduring systems we are developing to support the follow-on phases of a conflict must survive the initial attack and the follow-on attacks, with the sustained effects of nuclear detonations, and radioactive fallout.

Of the systems addressed within our strategic C^3 budget request, the major enduring capabilities will be provided by the: [deleted].

These programs, coupled with our on-going analyses of how to further increase our endurance capability, reinforce our overall deterrent posture by removing the option to Soviet attack planners of considering a [deleted] as well as discouraging them from thinking that they could achieve their objectives through a multiple-exchange campaign.

E-6A PROGRAM

Senator Levin. Mr. Latham, last year Admiral Nagler, the Navy's C^3 chief and a fellow witness then and now, testified about the Navy's position on the ECX program to replace TACAMO aircraft now used to communicate with our strategic ballistic missile submarines. He Said: "We believe and the Chief of Naval Operations said that is the most vital Navy program he has in strategic connectivity—to give that connectivity more enduring capability." Admiral Nagler also said: "* * * I cannot emphasize too much that ECX [deleted].

This year however, Admiral Nagler says that because the Navy "was required to provide offsets of $455 million for potential cost growth funds in the shipbuilding and conversion account," the Secretary of the Navy cut the procurement of the two ECX aircraft in the FY 85 budget which were projected last year.

Did the Office of the Secretary of Defense impose this requirement on the Navy that, in order to pay for the 600-ship Navy, it would have to cut a "most vital" and "critical" strategic C^3 system without which many of those ships would be useless?

Mr. Latham. The Office of the Secretary of Defense did not specify that the Navy should cut a vital and critical C^3 program to provide an offset for potential cost growth in the ship building and conversion account. The Navy decision to offer the E-6A program as an offset was strictly due to budgetary considerations. Since that time, a detailed review of this critical program has been conducted. The Secretary of Defense has recently concluded that the E-6A has the speed, endurance, survivability, mission payload and availability required to meet TACAMO mission requirements and that the program must proceed.

Senator Levin. Did you object to this proposed cut of these two TACAMO-replacement aircraft, Mr. Latham? If not, does that mean the program really is not that important? If so, on what grounds were you overruled by your superiors in DOD?

Mr. Latham. I have opposed the cut in the E-6A program since the beginning. The reduction in this program contained in the President's fiscal year 1985 budget request was a matter of budgetary considerations rather than an adverse reflection on the requirement. The reduction in funding led to an exhaustive review of this critical program within the DOD. The Secretary of Defense has recently concluded that the E-6A is the preferred aircraft to carry out the TACAMO mission and that the program must proceed. I heartily endorse this position.

TACAMO BUDGET REQUEST

Senator Levin. Admiral Nagler, you say the SECNAV restored the procurement after savings were negotiated in both the ECX program and the shipbuilding account. If the Navy was originally willing to give up this program, or significantly delay its procurement, just to buy a few more ships, why should the subcommittee believe it is so important to fund?

Admiral **Nagler**. Navy was forced to reevaluate the need for an E-6A replacement airframe because of current budget constraints. Over the past six months this program has undergone intensive scrutiny to reduce program costs and validate the need for a replacement airframe. These reviews have reinforced the necessity for E6A as a key part of the President's Strategic Modernization program. Extensive contractor negotiations have produced a program that will meet objectives.

Senator **Levin**. Admiral Nagler, GAO recently issued a report very critical of both the present TACAMO aircraft fleet as well as of the Navy's plans for its replacement. What is your reaction to this report, and can you provide a point by point rebuttal to the committee for the record?

Admiral **Nagler**. It appears that the General Accounting Office conducted a thorough review of the TACAMO program. The report assesses TACAMO's ability to accomplish its mission. GAO's conclusions address three areas of concern: (1) [deleted] are identified as part of the Strategic C^3 modernization program. A major [deleted] is the [deleted]. A point by point rebuttal follows:

GAO Issue: GAO has attributed TACAMO's [deleted] resulting in what GAO calls [deleted].

Navy Position: Navy concurs that [deleted].

GAO Issue: GAO has indicated system [deleted].

Navy Position: Navy presented to Congress two reports "Alternatives to the Navy TACAMO Airborne Relay System" on 25 January 1982 and "Airborne Strategic Communications System Alternatives (Navy) and Related Procurement Strategies" on 11 March 1983. As the studies indicate the solutions to reliability and readiness of the aging TACAMO system are the E-6A with the follow-on communication suite improvements.

GAO Issue: GAO has indicated that the [deleted].

Navy Position: Navy concurs with this GAO conclusion only in that the [deleted] TACAMO [deleted] from December 1981 to date, using [deleted].

GAO Issue: GAO has indicated that in a [deleted].

Navy Position: It is recognized that [deleted] taken the possibility of [deleted].

BLUE-GREEN LASER SYSTEM

Senator **Levin**. Mr. Latham, recently the head of DOD's Advanced Research Projects Agency (DARPA), Dr. Robert Cooper, testified before the House Armed Services Committee that DOD scientists had made great breakthroughs in the past year which make it much more feasible and far less expensive to develop a blue-green laser system to communicate from satellites to missile submarines. He is reported to have "likened the laser receiver breakthrough to a development in aviation of going from a Piper Cub propeller plane to a jet airliner."

Can you summarize for the subcommittee now what have been these breakthroughs in the past year, and could you provide more details for the record in each area?

Mr. **Latham**. The effectiveness of a communications system is a summation of the capabilities of the transmitter, the receiver, and an understanding of the physical characteristics of the medium through which the signal is transmitted. We have made significant progress in all three areas.

a. We have developed a laboratory test model of the optical filter which will be the front end of a very efficient and narrow band optical receiver. Using the principle of [deleted] this device has already proven to be better than previous models.

b. Matched to the fixed, [deleted].

c. Our recent propagation studies also indicate that [deleted]. The improvements could be used: to increase the depth to which we can communicate in a one-way transmission to submarines, to increase the data rate of they system, to reduce the size of the transmitter so that it becomes more compatible with the requirements of space qualification, or some combination of the three. However, engineering all of these subsytems into reliable space hardware will require [deleted].

Senator **Levin**. Mr. Latham, Dr. Cooper also was quoted as saying that these breakthroughs laid the groundwork for DOD or the Navy to "be able to begin the work on an operational laser communications system for the early 1990s." This is considerably earlier than testimony last year said we could expect to have such a system. Please provide for the record a plan as to how DOD and the Navy could achieve such a system and at what cost.

Mr. **Latham**. As I noted, there have been a number of strong technical and operational advances resulting in major projected performance improvements in the SLC concept. As a result, we feel that there are no longer any unresolved issues about the basic physics of laser communication to submarines, although significant engineering work remains to translate these technologies into a reliable and survivable system. In fact, satellite system survivability is a major technical and operational issue to be addressed (as we have done with MILSTAR) before we ever commit to a space-based laser communications system. Each of the features actually needed for a real system have now been separately demonstrated in the laboratory. The remaining technical issues involve engineering these technologies [deleted] that will be tested upon a submarine; and into a laser transmitter capable of space-qualification and of serving as an opertional space-based submarine laser communications transmitter.

The DARPA program is now narrowing its focus to complete the development of technologies that should enable an effective operational satellite-to-submarine communication system to be in place by the [deleted]. The effort is aimed at resolving the final technical issues needed to support a Navy decision in 1986 or 1987 to begin development of a system which can communicate to submarines at depth, at any speed, and through thick clouds without interfering with the submarines' operational employment.

It is premature to predict the cost of such a system. However, a rough order of magnitude estimate, based on experience of system of comparable size and complexity, is that a system consisting of one operational satellite and a reasonable number of receivers is about $1 billion (−30% to +100%) which would be incurred over a number of years.

Senator LEVIN. Mr. Latham, it is my understanding that these significant breakthroughs were in the areas of both a much more capable communications receiver for submarines to pick up laser signals, even from high altitude satellites, and a more powerful yet smaller and lighter laser transmitter for satellite applications. Would you agree with these statements?

Mr. LATHAM. The statements are correct. The projected improvement comes principally from [deleted].

Senator LEVIN. Is it not true that the breakthroughs with what is known as the [deleted] mean that we can develop a receiver which has greater performance and reception capabilities, even under poor weather and water conditions, thus reducing the power requirements for the space-based transmitters?

Mr. LATHAM. Yes. Projected performance is greatly improved even while required laser power has dropped from over [deleted] watts to less than [deleted] watts.

Senator LEVIN. Doesn't this reduction in power requirements mean we can build a smaller transmitter, which would make satellite basing more feasible and less expensive?

Mr. LATHAM. Yes. In fact, the ground-based and mirror-satellite projects have been phased-out of the DARPA program in favor of the laser satellite approach.

Senator LEVIN. Is it not true that breakthroughs in the xenon chloride lasers area have lead to the conclusion that the technology for a laser communications transmitter is not as immature as some people contended in the past, and that development of a full space qualifiable system—laser, scanner and power supply—is only about 2-2½ years away?

Mr. LATHAM. No. It will require much longer development time than that to engineer, test and integrate a space-qualified, nuclear event survivable laser transmitter. The DARPA program last month released a request for proposal for a laboratory Transmitter Technology Test Module (LTM). This is to be a major effort which will resolve the remaining technical issues necessary to allow us to make an informed decision whether to start a satellite program or not. The LTM will include everything from power supplies, through laser and frequency conversion, to beam forming and directing optics. With small changes and improvements made as a result of the extensive testing program, and with the replacement of some parts with space-quality ones, the LTM design should be space qualifiable. Given reasonable success in the LTM program, we may, in fact, be ready to start building qualification and flight transmitters within the next several years.

Senator LEVIN. Haven't these breakthroughs in the laser and receiver led to the conclusions that the capabilities of such a satellite communications system in terms of high message data rates and water penetration depths is much better than previously thought? Please provide these details for the record.

Mr. LATHAM. Such increases are indeed projected.

Relative to the technology which we will be testing on a submarine in late May of this year, the atomic resonance filter offers a several hundred foot increase in the depth achievable or a factor of fifteen decrease in message delivery time or a factor of [deleted] decrease in laser power. Any actual system will probably make some use of the improvement to help out in all three areas. However, it is important to realize that these are improvements over an earlier system whose performance parameters were promising but may not have been good enough to warrant implementation.

Senator LEVIN. Is it not true that the receiver breakthroughs mean the scientific community is only one year away from developing a laboratory test model receiver and only two years away from having a submarine test model receiver—if the program is properly funded by DARPA and the Navy?

Mr. LATHAM. That is the current plan. A competitive procurement action is underway to be funded by both Navy and DARPA money. The end product of this would do for the receiver what LTM is expected to do for the transmitter: resolve the technical issues of integrating existing technologies. If all goes as anticipated we will have a submarine qualifiable receiver in about two years. Again, as in the case of the LTM, an actual production model will then need to be designed by the Navy to fit within their operational concepts, and this will require several years of engineering work.

Senator LEVIN. Is it not true that there are no major technological or scientific obstacles to developing an operational test receiver for a submarine within two years?

Mr. LATHAM. Using individual technologies already demonstrated, DARPA and the Navy are assembling laboratory and submarine test receivers on a two-year timescale. There do not appear to be any remaining fundamental technical obstacles.

Senator LEVIN. Is it not true that DOD now has evidence which demonstrates that the xenon chloride laser transmitter coupled with the cesium atomic resonance filter receiver should permit deployment of a high-altitude satellite laser communication system capable of data rates over large ocean areas much higher than the message data rates ELF system can achieve?

Mr. LATHAM. This is a difficult question to answer because it is sometimes deceptive to compare systems as different as ELF and SLC on the basis of message data rates alone. ELF communicates a single data stream to large ocean areas simultaneously, so that data rate is one useful measure of performance. SLC performance transmitting messages, however, is more dependent on the specific operational scenario. The reason for this is that SLC can trade off depth of penetration, area-of-coverage, and data rate.

In spite of many differences, I will attempt to draw some general comparisons. If SLC is forced to communicate with submarines at normal operating depths, over entire ocean areas, at night and under adverse weather conditions, then the [deleted]. On the other hand, if the submarines operate nearer the surface, or are confined to smaller operating areas, or work under better weather conditions, or benefit from a combination of these favorable factors, then the [deleted] whose performance is not affected by these factors. Clearly, SLC offers more flexibility than can be obtained with ELF. ELF can be used to provide constant connectivity at relatively fixed data rates with every submarine over vast areas almost independent of climatic factors, whereas SLC offers the potential of communications at higher data rates to some of our submarines whose operational parameters are somewhat restricted. In essence, ELF and SLC are not so much competing systems as they are complementary.

Senator LEVIN. Mr. Latham, the recent progress in the blue-green laser field has caused many decisions to be made and the technology program to be substantially modified from that described to Congress previously. So that we may better understand the impact of these advances, please provide a detailed summary of the DARPA program for fiscal year 1985 and fiscal year 1986 giving major program areas, tasks, funding distribution by task, and the expected technical results and milestones.

Mr. LATHAM. The DARPA program is principally structured to resolve any remaining fundamental technical issues so that the Navy can make a satellite program initiation decision. It is also possible that current negotiations between DARPA and the Navy will result in an airborne SLC test program [deleted]. The program has been radically changed in the past few months; for example, the ground based approach has been deleted and development of space-qualifiable transmitter and submarine qualifiable receiver has been added.

The following table shows the DARPA funding breakout for SLC and blue-green laser technology.

[In millions of dollars]

	Fiscal year 1985	Fiscal year 1986
Satellite transmitter technology (XeCL and LTM)	$11.4	$11.4
Submarine receiver technology (atomic resonance)	2.6	2.9
Airborne and other tests	3.7	6.0
System and propagation modeling	1.9	2.5
Advanced transmitter and receiver technology	6.4	7.5
Total	26.0	30.3

The current intention at DARPA is to stop work in the SLC program at the conclusion of the efforts to develop and test the space-qualifiable transmitter and the submarine test receiver. This may happen by the end of fiscal year 1986 or fiscal year 1987. At that point we will have to decide on what, if any, SLC satellite program to initiate.

Major milestones are:

End FY 84: Complete air-to-sub test series with old design [deleted] watt transmitter and receivers. Expected performance: [deleted].

End FY 85: Complete and test laboratory model of atomic resonance receiver.

End FY 86: Complete submarine test receiver for experimental use.

Mid FY 86: Complete LTM.

FY 86-87: Navy initiation decision for operational SLC satellite program.

Senator EXON. We are adjourned.

[Whereupon, at 10:36 a.m., the subcommittee adjourned, subject to the call of the Chair.]

DEPARTMENT OF DEFENSE AUTHORIZATION FOR APPROPRIATIONS FOR FISCAL YEAR 1985

THURSDAY, APRIL 12, 1984

U.S. SENATE,
SUBCOMMITTEE ON STRATEGIC AND
THEATER NUCLEAR FORCES,
COMMITTEE ON ARMED SERVICES,
Washington, DC.

ANTISATELLITE PROGRAM AND ARMS CONTROL ISSUES

The subcommittee proceeded in open session, at 11:42 a.m., in room SR-222, Russell Senate Office Building, Senator John W. Warner (chairman) presiding.

Present: Senators Warner, Levin, and Bingaman.

Staff present: Arnold L. Punaro, staff director for the minority; Robert F. Bott and William E. Hoehn, Jr., professional staff members; Douglas R. Graham, research assistant; Karen A. Love and Inga B. Schoonover, staff assistants.

Also present: Les Brownlee, assistant to Senator Warner; Robert Savitt, assistant to Senator Cohen; Mark J. Albrecht, assistant to Senator Wilson, Janne E. Nolan, assistant to Senator Hart; Jeffrey B. Subko, assistant to Senator Exon; Peter D. Lennon, assistant to Senator Levin; and Edward McGaffigan, Jr., assistant to Senator Bingaman.

OPENING STATEMENT BY SENATOR JOHN W. WARNER, CHAIRMAN

Senator **WARNER**. The subcommittee now convenes in open session to receive testimony from both public and administration witnesses on the subject of antisatellite [Asat] weapons and related arms control issues.

We began this hearing in executive session to receive testimony from intelligence community witnesses on current and projected Soviet Asat capabilities, and the problems associated with verification of Asat arms control proposals.

Our first panel this morning consists of Robert W. Buchheim, the former head of the U.S. Delegation to the United States-Soviet Asat talks; Dr. Michael May, the Associate Director-at-Large from Lawrence Livermore National Laboratory; Dr. John Steinbruner, the Director of the Foreign Policy Studies Program at the Brookings Institution; and Dr. Victor H. Reis with Science Applications Inc.

There is a footnote here. The chairman made available this morning the opportunity for each of these four panelists to attend the classified briefing and my understanding is all four availed themselves, at least in part, of that opportunity.

Our second panel consists of two officials from the Reagan administration; Richard Perle, the Assistant Secretary of Defense for International Security Policy; and Dr. Hank Cooper, Assistant Director, Strategic Programs Bureau, from the Arms Control and Disarmament Agency.

On behalf of the subcommittee, I welcome each of you this morning.

The purpose of this hearing is to receive testimony representing various points of view on antisatellite weapons, and the prospect for effective arms control in this area.

On March 31, 1984, the Reagan administration forwarded a report to the Congress on U.S. Policy on Asat Arms Control. This report contained a very realistic assessment of the prospects for achieving comprehensive and effectively verifiable arms control on Asat weapons.

While the conclusions the administration reached are disappointing, I intend to explore all alternatives of what options are available even though they may be limited, before reaching a conclusion.

Before we proceed, I again invite my colleague, Mr. Levin, in the absence of the ranking minority member, Mr. Exon, who is attending a budget hearing this morning—although he was present for the classified briefing and had to depart—to make a statement.

Mr. Levin?

Senator LEVIN. Thank you, Mr. Chairman.

In light of the hour, I am happy to just proceed to our panelists.

Senator WARNER. Mr. Bingaman?

Senator BINGAMAN. Likewise, Mr. Chairman. I am looking forward to the testimony.

Senator WARNER. We will open with the distinguished Hon. Robert Buchheim, former head of the United States-Soviet Asat Talks.

STATEMENT OF HON. ROBERT W. BUCHHEIM, FORMER HEAD OF U.S. DELEGATION TO UNITED STATES-SOVIET ASAT TALKS

Mr. BUCHHEIM. Mr. Chairman, I am honored to be invited to offer comments to this distinguished committee on the general subject of military space activities which might or might not be usefully brought under internationally agreed limitations.

The specific title I have chosen for this statement is my own—"Military Space Activities, Arms Control, and Military Preparations"—it reflects roughly what I will talk about.

I am here on very short notice, so my remarks in some or many places will be lacking in elegance and completeness, but here we go.

AGREEMENT SCOPE

First, I invite your attention to testimony I was privileged to give before the Subcommittee on Arms Control of the Senate Committee on Foreign Relations on September 20, 1982, Print No. 99-711-0.

That testimony includes comments on a topic which I consider to be very important in deliberations on the possible relationship between arms control and space activities, that is, the frameworks and details of potential international agreements, usually referred to under the heading "scope".

I will not repeat all of that commentary here, but I will summarize its essence.

In my opinion, a general antisatellite agreement dealing with violent actions against space objects—and only space objects—and means for such violent actions, is both desirable and possible, but, also, in my opinion, no general antisatellite agreement will ever be devised to deal usefully with actions, or means for such actions, to influence the carrying out of mission functions through systems using space objects as components.

Mission systems include more components than just space objects, as, I am sure, will be discussed by other witnesses, and useful understandings and commitments as to mission functions can only be dealt with in a practical fashion through ad hoc agreements such as the SALT provisions concerning noninterference with the carrying out of the verification function or the International Telecommunications Convention as to the communications function.

There might well be, in the future, agreements to assure the carrying out of system missions, but, in my opinion, they will be few and far between.

For example, I cannot foresee any chance of, or desirability of, an agreement in which any party A will give its assurance that no impediment will be placed in the way of any other party's pursuit of the system mission of targeting naval combatants of party A.

I have mentioned the possibility of international agreement on antisatellite activities because that is the present center of discussion, and properly so.

I have also mentioned the matter of feasible and desirable scope of such potential agreements because I think that to be crucial. Overreaching by trying to regulate system functions on a general basis can only bring well-deserved failure.

No responsible government is going to agree, for example, to abandon its right to turn off electronic emitters at times of its choosing in order to honor some ill-advised agreement to enable the carrying out by some other party of the system function of gathering intelligence information on all such emitters.

On the other hand, it might agree in specialized ad hoc agreements to certain limitations on that right, and this has some bearing on the vexed question of telemetry encryption, but it is not a topic to be dealt with in a practical Asat agreement; it is a separate system function question.

NAVAL INTERESTS

All of that having been said, I will now plunge into the body of initial considerations which seem to me to inform the relationship between naval interests and satellite evolutions.

To leap to the end, the Soviet radar ocean reconnaissance satellite [Rorsat] is an interesting development and perhaps even a useful stimulant to more thorough consideration of resources to be made available for desirable evolution of naval forces, and not just material resources.

Rorsat is, however, in my opinion, not a threat which ought to dominate U.S. national security policy deliberations as to evolution of the surface Navy.

Much of the expressions of concern about Rorsat and possible variants is that it can, in real time, find, identify, and fix the locations of aircraft carriers. Three comments:

One, Rorsat cannot do all of that at all times.

Two, other means for doing these things are available to our principal potential naval adversary.

Three, practical steps can and should be taken to deal with means for finding, identifying and marking the locations of major U.S. naval combatants.

The reality, current and of enduring character, of practical arrangements to determine circumstances of surface combatants—their locations and other features—have been known for a long time, including radar reconnaissance satellites, and the Navy has, over the years, attended to balancing the many possibilities for dealing with such arrangements—short of blowing them to bits—but it has also long been clear that development of countering measures will be difficult and an endless task.

The entry of Rorsat into that eternal task is, in my opinion, slight cause for fiscal incontinence, much less a cause for induction of damage to more important national security interests.

The surface Navy is a powerful and usable asset, whether or not Rorsat is further developed.

What are the detection and targeting threats to the surface Navy, and moderating factors?

These topics include at least the following considerations:

One, it is rather easy to know the types and numbers of ships in a significant Navy.

Two, it is rather easy to know the comings and goings of naval combatants to and from home ports.

Three, it is not difficult to accompany major naval combatants at sea—as a particularly important example, the United States has fewer than 15 aircraft carriers, while the Soviet Union has many more than 15 surface combatants, attack submarines and long-range, land-based airplanes with maritime capabilities.

Also, people in merchant ships can notice nearby naval combatants.

Four, sometimes it is important to render obscure information about the locations of surface combatants. For example, the obscuring of such information was quite important in the movement of the Japanese fleet toward Pearl Harbor in 1941; it was of little importance in the deployments toward the battle of Jutland in World

War I, and of no importance in the standing off of United States combatants near Lebanon in 1984.

Five, obscuring of information about movements of naval combatants has long had much to do with close attention to the self-targeting potential of radio emissions, as was experienced in World War I, in World War II, and in recent times.

A modern example is the powerful emissions of the Aegis radars. They cannot be missed by an alert opponent; their tactical control must be attended to.

Their visibility off Lebanon was a matter of indifference. All in all, naval security is best served, in my opinion, by being able to control radio emissions from surface combatants.

Six, further on this matter, it continues to be true that long-haul radio transmissions from combatants at sea can be detected and used for location-fixing purposes by high-frequency, direction-finding stations in Soviet territory.

Seven, radio emissions are not the whole of the matter. Naval combatants moving at interesting speed also put out distinctive acoustic signatures which can be detected and tracked at long distances.

Eight, it continues to be true that there is a type of maritime weapon that has an enduring unique asset; it is found, too late, by the ship. That weapon is the naval mine. It has also grown in recent years.

For a long time, the mine was a weapon deployed mostly in shallow coastal waters; indeed, around the turn of the century, an international agreement was constructed to keep it that way.

Now, however, we stand in the presence of such developments as the Captor mine which make it possible to mine deep waters, and one can see the practical possibility of oceanwide mining.

Nine, without going on more about such matters, I will jump directly to the possible contribution of Rorsat to this complex of detection and tracking possibilities.

Two points are of major significance:

First, Rorsat can be countered electronically.

Second, even if not countered, unless deployed in large numbers, Rorsat cannot provide continuous identification and targeting information. The Earth will continue to rotate, once every 24 hours, and orbital periods will continue to follow the deductions of Isaac Newton.

What is to be done? The main things to do are:

To recognize explicitly and continuously the many ways through which naval surface combatants can be found and tracked.

To continue the diligent work of the Navy in devising techniques, equipment, and tactics—and I place emphasis on tactics—to counter ways for finding and tracking surface combatants, if need be.

To develop further the available means for land-based headquarters to keep a commander at sea informed as to the situation he is to be faced with, including the passage overhead of a Rorsat, which is quite predictable.

To reduce to a minimum any need to blow up Rorsat rather than responding to it in other ways, because induction of a regime of blowing up satellites would prejudice space assets of much greater importance, in particular intelligence collection assets that are central to our pursuit of strategic stability and armaments restraint.

The U.S.S.R., in fiddling with Asat experiments, did a bad thing. In my opinion, we ought to strive to pull them back from this unfortunate activity, not join them in its pursuit.

Their Rorsat should not be allowed to push us toward counterproductive activities. If the Soviet Rorsat should become truly unbearable, we can at least try for an agreement to prohibit such things.

The Soviets may say they are against "militarization of outer space"—whatever that means. OK, let's agree to have no Rorsat. Such an agreement would not present much of a verification task, the beast does emit easily detectable radar transmissions.

Thank you, sir.

Senator **Warner**. Mr. Buchheim, I am reading an amendment before the Senate which states:

> The United States immediately resume negotiations on a mutual and verifiable ban on the testing, production, deployment and use of any anti-satellite weapon.

What is your judgment in view of the present Soviet-United States relationship of the immediacy of being able to enter into such talks?

Mr. **Buchheim**. We should start today, not tomorrow, but today.

Senator **Warner**. I beg your pardon.

Mr. **Buchheim**. We should start today, not tomorrow, but today.

Senator **Warner**. What is the likelihood that the Soviets would respond with equal enthusiasm, in your professional judgment?

Mr. **Buchheim**. Very good.

Senator **Warner**. Now, again, the Pressler amendment, I think, could be characterized as calling for a comprehensive agreement.

Do you think that both sides could immediately begin negotiations on a comprehensive agreement banning the production and deployment of antisatellite weapons and any other weapons directed toward space?

Mr. **Buchheim**. Mr. Chairman, I think we should seek to negotiate as thorough an agreement as we can.

But I don't think we should hold back on negotiating and hopefully putting into place restraints on antisatellite activities and means simply because we can't see what will happen a 1,000 years from now.

We should do the best we can. That is all we can do in this world.

Senator **Warner**. Thank you.

Do you have any questions, Senator Bingaman?

Senator **Bingaman**. Let me ask an obvious question. The report that we received, dated March 31, 1984, called "U.S. policy on Asat arms control," as I understand that report, it concludes on the first page:

> No arrangements or agreements beyond those already governing military activities in outer space have been found to date that are judged to be in the overall interest of the United States and its allies.

I gather your testimony is that you profoundly disagree with that conclusion on U.S. policy. Is that right?

Mr. **Buchheim**. Senator, I don't profoundly disagree with it; I don't even disagree with it at all.

All I can say further to that is that we should work harder on the matter. We are never going to get anywhere unless we work harder on the matter.

The reference in that report to the implied perfection of the current level regime as to activities in outer space, I think is wrong. It is not a regime that is perfect.

In fact, it is a regime that is seriously flawed and does need to be developed and can be developed. All that is required is to work on it.

Senator **Bingaman**. That is all I have, Mr. Chairman.

Senator **Warner**. Thank you.

Our next panelist is Dr. Victor Reis, Science Applications Inc.

STATEMENT OF DR. VICTOR H. REIS, SCIENCE APPLICATIONS INC.

Dr. **Reis**. Thank you, Mr. Chairman, for this opportunity to express my views on antisatellite weapons and arms control.

This day is a most appropriate one to discuss this issue, since it was 23 years ago today on April 12, 1961, that the Soviets orbited the first man in space, Yuri Gagarin. With that first flight of the Soviet was initiated public competition in space, the so-called space race, and these hearings are testimony to the continuing vigor of that competition.

There are few subjects, however, that are as complex and as contentious as the business of antisatellites. Successive administrations have not been able to fully get a grip on the problem.

Authoritative, well-meaning, and knowledgeable people can disagree certainly, and often do.

And Mr. Chairman, the disagreements go beyond details to fundamental assumptions about the relationship between space and national security.

Let me just outline a few of these fundamental disagreements. Either satellites are very valuable in wartime, providing important military leverage, or satellites are peacetime systems only and cannot be relied upon to function in war.

Either the Russians are more dependent on space because of their geography or the United States is more dependent on space because the Soviet Union is a closed society.

Either it is very easy to destroy satellites because they are soft and their positions are known or it is very hard to kill satellites because they are far away and fast moving.

Either the Soviets are ahead in Asat because they have an operational system or the United States is ahead because the Soviet system has little capability and the United States system will be better.

Either there are so many ways to kill satellites that any sort of treaty will be unverifiable, or any major system, even Asat, requires enough testing so as to make it observable.

And perhaps this is the most important difference. Either there has never been a conflict in space, so it is important to make space a sanctuary or space is the ultimate high ground that must be gained and held for national security.

Given this divergence of views and beliefs, it is no wonder that we have not been able to come up with a consistent policy.

Frankly, I see no easy path of logic through all the rhetoric and analysis.

So, instead let me make a few simple suggestions which I believe will be doable and helpful.

First, I believe we can come up with some practical rules of behavior for operating in space during peacetime, rules that would reduce surprise and uncertainty.

An example of a rule might be the prohibition of unexplained close encounters with satellites. I believe adherence to such a set of rules would be in the mutual interest of all spacefaring nations and they should welcome the opportunity to agree.

Second, I believe we should continue with the development of our miniature vehicle program and deploy it if it proves to be a militarily effective weapon system.

I do not think halting its development will necessarily lead to a more stable, secure world and I do not think that deploying it will necessarily lead to an arms race in space.

Finally, regardless of what else happens, the United States should continue to make its important space system as survivable as reasonably possible.

Senator **Warner**. Dr. May, Associate Director-at-Large, Lawrence Livermore National Laboratory.

STATEMENT OF DR. MICHAEL MAY, ASSOCIATE DIRECTOR-AT-LARGE, LAWRENCE LIVERMORE NATIONAL LABORATORY

Dr. **May**. Thank you, Mr. Chairman.

Thank you for the opportunity to appear before this committee on this subject.

I only have one point I want to make in my remarks and that concerns the connection between the survivability of our space systems and the possibility of either arms control or any other kind of security in space.

As you know, sir, and as this committee knows, the United States and probably the Soviet Union are heavily dependent on space for both civil and military operations, for communications, for warning, for surveillance, weather forecasting, navigation, and other crucial activities, some of which cannot be carried out as well any other way and some of which cannot be carried out at all in any other way.

Use of space for those activities is going to increase rather than decrease, given the development of technology in the two countries. Some of it is probably going to be extended to other countries in the years to come.

For that reason, we and the Soviet Union have some considerable potential for causing each other great concern with what we do in space and also what we imagine the other might be doing in space, whether it is doing it or not.

Now, the space systems through which these functions are carried out are unnecessarily vulnerable to attack today.

Without going into any classified details, I think that it has been made clear to this committee that attacks of a variety of nature could disable present space systems.

Space systems consist of satellites and of ground stations, which are more vulnerable than satellites. The links between ground stations and satellites can also be attacked.

I believe that, so long as this vulnerability exists, it is going to be hopeless to try to work our way through to any kind of meaningful arms control or to work for any kind of security in space.

I don't believe development of an Asat would give us security in space any more than some sort of arms control which cannot be adequately verified.

On the other hand, I think that designing our space systems, as we have begun to do, so that they can be survivable to all but very large attacks opens up the possibility of verifiable arms control, because a little bit of cheating would not matter so much, and makes it possible for us to rely on our space systems with security.

There is no way, of course, to make space systems invulnerable to all kinds of attack. There are a number of ways, however, to take advantage of various designs so that a space system would be difficult to attack and would be reliable for some considerable length of time in wartime.

Those methods include proliferation of ground stations, proliferation of satellites, cross linking between satellites and other methods.

To repeat, it is impossible to make space systems entirely survivable, but it is quite possible to impose on the would-be attacker of these space systems a heavy burden, in cost and time, and in risk.

I believe that doing this is the key to any kind of progress toward security in space.

Now, this obviously costs money. The cost varies with the systems involved. The cost has been estimated to range from some few tens of percent to possibly 50 percent of the system cost. It is money that has to be spent, even though it is spent for something not immediately useful. We have to continue the program of making our space systems less vulnerable to attack over the next decade or so in much the same way that we have had enduring programs to make our strategic offensive weapon systems largely invulnerable to attack.

I would like to remind you that arms control with respect to strategic offensive systems would not have been possible if these systems had been vulnerable to easy, simple attacks by the other side, because, under those circumstances, an amount of cheating which is small and cannot be detected would have made a lot of difference to our survivability.

The question of when and on what basis to begin discussions with the Soviet Union on an arms control agreement in space is not one on which I am an expert and I do not have recommendations to make on that score.

I tend to agree with Ambassador Buchheim that it ought to be done as soon as reasonably possible. However, some considerable amount of homework has to be done ahead of time as to what we will talk to them about and the talks must go hand in hand with a continuing program of making our space systems as largely invulnerable as possible.

This concludes my prepared remarks.

Senator WARNER. Dr. May, the costs associated with that tactic are very large, are they not?

Dr. MAY. They vary, sir. That is a complicated question to answer. You have to go system by system.

Let me make a couple of general remarks that might be helpful in this regard.

One is that, in a wartime situation, you don't have the same requirements that you have in peacetime, particularly for some of the very expensive peacetime surveillance and verification systems.

In wartime, you want different kinds of information and you don't necessarily have to duplicate the whole peacetime satellite system.

The second thing is that it is easier and cheaper to defend against attacks which involve low levels of energy and unsophisticated weapons.

I am not sure how far I can go in an unclassified meeting, but levels of attack by lasers or other methods which——

Senator WARNER. Let me interrupt you because my colleague and I have to vote.

[Recess.]

Senator WARNER. Dr. May will you please continue.

MAKING SPACE SURVIVABLE

Dr. MAY. We were discussing the cost of making space survivable.

It is an effort that was started and should be continued. I was pointing out that defending against low-level effects, such as a few missiles or low-power lasers or things of that sort, is relatively inexpensive, particularly so if these measures are taken at the time the system is designed rather than trying to fix it afterward.

It won't increase the cost nearly as much as it does in the case of strategic weapons.

Senator WARNER. The question that is raised, Dr. May, is would it be in our national interest to have an agreement which restricted our miniature homing vehicle Asat systems while allowing the Soviets to retain their operational Asat systems?

Would that be in the national interest?

Dr. MAY. I think it depends on what we do in the way of making our space systems not vulnerable to the Soviet system.

The present Soviet system is a clumsy, limited first-generation system and we can, without too much trouble, remove much of our vulnerability to it. Perhaps we have.

That would make their system a wasted effort and a dead end. If we can then have an agreement with them which would be sufficiently verifiable so that we can, with the survivability features of our system, rely on it for security, then I would give up the homing vehicle if that were the consequence of the agreement.

I would, in other words, make the decision on the miniature vehicle system depend upon what kind of suitably verifiable agreement we could obtain. That means that I don't think we should stop development now.

Whether we should deploy it or not depends on what happens between now and then.

Senator WARNER. Doctor, the technology of low-power lasers is really worldwide, is it not?

Dr. MAY. Yes, sir.

Senator WARNER. It is a very versatile application of technology and has a variety of uses.

Could that low-power laser be applied in some form to Asat systems by a nation?

Dr. MAY. I think I have to be careful to avoid classified material.

Senator WARNER. The question was carefully phrased to present to you, given the technologies widespread and has multiple uses today, could the technology be adapted to a variety of Asat systems?

Dr. MAY. Only if the designers of the space system are remarkably careless about protecting their systems against that technology.

In other words, I think it is no great challenge to design space systems which will not be affected by the low-power lasers which are widespread.

Senator WARNER. Similarly in the field of electronic emissions could a nation devise that technology such that it could be usable for Asat?

Dr. MAY. The field of electronic measures and countermeasures is a very complex one. I don't think either attacker or defender has a permanent edge.

It is the same situation as in nonspace applications. I would not want to give you a final overall judgment in that area. I believe electronic measures and countermeasures will be with us for a long time.

It is possible that this is an aspect that cannot be brought under control.

Senator WARNER. In terms of revising our satellite fleet, so to speak, to build in a deterrent capability to electronic measures and countermeasures; is that correct?

Dr. MAY. Yes, sir.

DEFENDING AGAINST LOW-POWER LASERS

Senator WARNER. In other words, you couldn't have a comparable program to defend against low-power lasers?

Dr. MAY. You could have a comparable program, but I don't think it would be final. It is not possible to make a final judgment and say, well, space satellite systems can be designed to be protected against this kind of attack forever.

I think you have a situation where sometimes the countermeasures will have the advantage and sometimes the measure will have the advantage and it is going to depend on the time and the system.

It will be an evolving situation. I don't think it is going to be black and white.

On the other hand, I think protection against low-power lasers can be designed in such a way that we don't have to worry about low-power lasers any more.

Senator **Warner**. Therefore, on low-power lasers that were designed for the purpose of Asat, you would achieve a balance there through affecting the satellites themselves and defend against that category of weaponry the subject of an arms control treaty?

Dr. **May**. Yes, sir. I would do that, yes.

What that would mean is that a laser attack, to be effective, would have to involve high-power lasers, many of them. At that point the Asat system becomes detectable and verifiable.

Senator **Bingaman**. As I understand it, you are not saying that we need to develop the survivability of these satellites before we should pursue arms control?

You are saying that the two should go forward simultaneously? Am I correct in that understanding?

Dr. **May**. Yes, sir, they certainly can go forward simultaneously. When you actually begin to talk with the Soviet Union depends on a lot of things. I can't give you an opinion when you actually start. It depends on readiness to talk and whether the agenda is ready.

But they can go forward simultaneously. An agreement should not stop us from continuing our effort to make the system survivable.

Senator **Bingaman**. You do not see technological obstacles in the nature of the need for more survivability which stands between where we are now and the possibility of negotiated arms control in this area?

Dr. **May**. I have a tough time answering, not having surveyed all the systems lately. So, to give you a definite answer is a little difficult.

My guess is we could start talking at least about such matters as rules of the road and start doing some kind of homework about what kind of Asat systems could be banned. We do need to proceed expenditiously.

Senator **Warner**. We will now proceed to Dr. Steinbruner, director of the Foreign Policy Studies Program, the Brookings Institution.

STATEMENT OF DR. JOHN STEINBRUNER, DIRECTOR, FOREIGN POLICY STUDIES PROGRAM, THE BROOKINGS INSTITUTION

Dr. **Steinbruner**. I have a prepared statement that I will submit for the record. Let me summarize what it says, to save time.

As I read the President's report, it suggests that arms control measures against antisatellites do not appear to be feasible or desirable in his opinion. I disagree with that judgment.

Though it is clear that a comprehensive Asat agreement would pose verification difficulties, that fact pales in significance compared with the much more important fact that meaningful restrictions on further development of Asat capability, particularly at higher altitudes, are feasible, both technically and politically. Such restrictions can be verified and are overwhelmingly in the interest of the United States.

I also disagree with the characterization or at least the interpretation of the Soviet position that one finds in the report. It is true that the Soviet Union has an inherent capability for attacking satellites. It is even more significant how little the Soviets have actually displayed a dedicated capability to attack satellites despite the fact they could have done so for a long period of time.

In general in the draft treaty the Soviets submitted, the unilateral moratorium on Asat testing they announced, and the fact that Soviet Asat development has been much more sluggish than it could have been, all suggest a policy of restraint undertaken out of their own national interest.

That policy of restraint could be reversed. If so, U.S. interests in space could be seriously affected in the future.

I also note the importance of deciding our national interest at this point. In our space program at the moment we are pursuing direct weapons applications, military support civilian uses and scientific investigation, all at the same time and in the absence of any prospect for arms control.

Those purposes will be increasingly inconsistent and the chances are that, if we persist, the Soviet Union will probably threaten the security, and challenge the legitimacy of those assets in space on which we are dependent for military support, and other interests.

That would be a very severe development, and we should begin worrying about that.

Senator WARNER. You mean to suggest that the United States is proceeding at a tempo and level of investment that is at variance with what the Soviets are doing?

Dr. STEINBRUNER. Not in the narrow sense of antisatellite weapons. We do have our system, but I don't think that is a significant comparison.

The comparison is the overall situation between the United States and the Soviet Union as being read by the Soviet Union.

We may choose to disagree with the way they read it, but we should not ignore their perspective. We are putting military pressure on them in our defense budget, saying we intend to do so. We are engaging in a ballistic missile defense initiative and they consider antisatellite weapons programs as support for that initiative. If one has any ability at all to predict what Soviet political leaders are likely to do under these circumstances, one has to contemplate the possibility of very hostile reaction, a significant intensification of past Soviet programs in this area.

I think the Soviets are signaling that they would prefer to avoid such a development. I think they are threatening that if we choose direct weapon development in space, there are many countermeasures they can bring to bear, including a much more prominent, immediate threat to our military support assets.

I think we would be foolish to ignore that possibility. We have to choose what we really want. We can't have all these things at the same time and it is important to choose now.

My own choice would be overwhelmingly to have a regime of restriction on further antisatellite development in space, which I think is quite practical.

The only final point, which is not in my statement, is that Doctor May has made a very important point that the protection of our assets is an urgent requirement, quite apart from any arms control effort.

I simply point out that arms control arrangements can make that protection more feasible and less expensive and less constricting for normal purposes.

[The prepared statement of Dr. Steinbruner follows:]

PREPARED STATEMENT OF JOHN D. STEINBRUNER, THE BROOKINGS INSTITUTION[1]

PROSPECTS FOR ARMS CONTROL ARRANGEMENTS IN SPACE

In his report to Congress on March 31, 1984, President Reagan issued a negative judgment about the prospects for controlling the further development of anti-satellite [Asat] weapons by means of agreement with the Soviet Union, and he made it clear that he has no immediate intention to seek such an agreement. His reasoning revolved around three arguments: that comprehensive restrictions on antisatellite capability could not be adequately verified; that the Soviet Union had already developed anti-satellite capabilities to a point that restrictions on comparable U.S. capabilities would confer an unacceptable advantage on the Soviet Union; and finally that the development of U.S. weapons to attack Soviet ocean reconnaissance satellites is of sufficient importance to outweigh the benefits of mutual restrictions. In my own view these arguments and the conclusion the President draws from them constitute serious misjudgments of the fundamental security interests of the United States, so serious in fact that they are unlikely to withstand the pressure of events indefinitely. The question is whether our political process can bring about an orderly reconsideration before irreversible consequences have occurred.

Reconsideration should begin with the central argument in the President's report: the contention that the widely acknowledged difficulties of a comprehensive prohibition on Asat capabilities are so grave as to preclude a desirable agreement summarily without any attempt to achieve one. In fact these difficulties have far less significance for United States security than does the rather obvious opportunity for practical, verifiable restrictions on further development of Asat weapons. The importance of this comparison can be appreciated by considering a few basic facts about the current situation.

Over the past twenty-five years the United States has become very substantially dependent on communication and information gathering assets in space to support not only worldwide military operations but also international communication for all purposes. At the moment, for example, a very high percentage of intercontinental communication traffic flows through a network of less than 30 space satellites which by location and functional design are inherently vulnerable to attack. Loss of military support assets in space would severly degrade the capability to manage U.S. military forces and loss of communications assets would substantially isolate the United States from the rest of the world.

Though obviously aware of the importance and potential vulnerability of U.S. space assets, the Soviet Union has accepted our right for these assets to pass over Soviet territory, a right obviously not granted for airspace within the atmosphere. Moreover, as yet the Soviet Union has not chosen to display a dedicated capability to attack at semisynchronous (roughly 20,000 km) and synchronous (roughly 36,000 km) altitudes where the most valuable assets are located. It is technically within the grasp of the Soviet Union to develop such capability. As reflected in the President's report, some particularly suspicious intelligence analysts are able to imagine that they might have done so without our knowledge. The weight of evidence and the preponderant judgment, however, is that the Soviet Union has not yet developed discriminating high altitude anti-satellite weapons.

This omission, it is reasonable to presume, was not done out of consideration for the United States but rather for the much more reliable reason of mutual interest. The Soviet Union also depends upon assets in space for military support and for broader economic and scientific purposes. For that reason Soviet leaders appear interested in a regime of mutual restraint that would protect their own assets. Such as interest is certainly suggested by the successive draft treaties the Soviet have submitted to the UN General Assembly and by the unilateral moratorium on Asat testing proclaimed in August of 1983.

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[1] The views expressed in this statement are the sole responsibility of the author and do not purport to represent those of the Brookings Institution, its Officers, Trustees, or other staff members.

The latest Soviet Treaty draft could not be accepted without interpretative discussion and some alteration, but it certainly is a serious proposal. Unless meaningful negotiations are conducted, the sincerity of the Soviet position cannnot be tested.

Restrictions can readily be devised that would prevent both the development of discriminating high altitude Asat systems using rocket boosters and the further testing of lower altitude rocket propelled systems. Such restrictions could be verified without much question. If existing means of verification could not handle immediate requirements, that would indicate that gross mismanagement of American intelligence assets has occurred. In fact, they almost certainly can support these requirements. With the addition of only a very small percentage of the sensing and information processing capability imagined for the ballistic missile defense initiative, even very sophisticated verification problems that future circumstances might pose could be solved. Restrictions on the use of ground-based directed energy devices to attack space assets might pose more substantial problems for current verification capabilities, but the weapons themselves are in a relatively early stage of development. If meaningful weapons of this sort can be developed, there is no reason to believe that appropriate means for verifying restrictions on them cannot be. To suggest, then, that meaningful restrictions are a priori impossible to verify is quite simply a preposterous proposition.

Since meaningful restrictions on the further development of Asat capability would preclude American as well as Soviet weapons, a net judgment must be made regarding the relative interest of the United States in the direct use of weapons in space on the one hand and in the use of space for military support, for scientific investigation, and commercial activities on the other hand. The implication of the President's report is that he wants to pursue all these different purposes and at least for the time being to avoid any decision among them. He would like to do so, moreover, in a political context dominated by a very explicit United States program for exerting increased military pressure on the Soviet Union (potentially including the use of space for ballistic missile defense), by both practical and explicitly stated threats to existing arms control arrangements, and by the absence of any serious prospects for replacing or supplementing these arrangements. Unfortunately reality will not be so permissive. There are inherent conflicts among these purposes that cannot be avoided.

If there is anything at all predictable about the Soviet Union it is that Soviet political leaders under these circumstances are not likely to allow the United States to pursue the direct use of weapons in space without posing an immediate challenge not only to the physical security but probably also to the legitimacy of space assets used for military support. There are already subtle indications of such a policy and even if there were not it would be extremely foolish not to anticipate it. There is a dark side, if you will, to the Soviet position: without some regulated regime for the use of space that restricts direct weapons application, all space activities will come into question; under such circumstances space will not be safe even for those purposes now accepted as inherently peaceful.

In contemplating this possibility, the assessment of Soviet weapons programs in space up to this point assumes considerable significance, and it is not a matter to be casual or fanciful or ideological about. The only system clearly demonstrated, the non-nuclear interceptor on an SL-11 launch vehicle derived from an AS-9 ICBM, is quite limited in its capacities and in the scale of its deployment. It could be considered a rough counterpart, at least in terms of a minimum display of capability, to an earlier U.S. system once deployed on Johnson Island and then deactivated. Beyond that, what is most striking about the Soviet space effort is the absence of hard evidence of more advanced Asat capabilities despite the fact that the current system is rather old and of poor quality. In the context of Soviet military programs these facts and the self-imposed moratorium on testing do constitute definite, deliberate restraint whether for constructive, nefarious or simply prudent reasons. Both in terms of technology and of policy the Soviet Union could choose to be far more directly threatening to U.S. space activities than they have yet been and it is simply false to suggest that Soviet Asat capabilities have already reached the point that desirable restrictions are inherently precluded. Quite the contrary; we have lived so far under an informal regime of relative restraint whose considerable benefits could be taken away.

In my own mind I have no difficulty reaching the judgment that the natural interests of the United States are, on balance, overwhelmingly on the side of imposing a categorical prohibition on all further testing or development of direct weapons use in space. The purpose of this is to establish the legitimacy and help to protect the physical security of space assets for military support and strictly civil uses. Compared with what is at stake in these purposes, the problem posed by Soviet ocean reconnaissance satellites is trivial and can be dealt with in many ways other than direct attack. I also believe that the alleged deterrent effect of U.S. Asat developments is so likely to backfire and ultimately to stimulate not only potential but actual interferrence with U.S. satellites, that any limitation on the deterrent effect that restrictions might impose is a benefit rather than a cost of those restrictions.

Even for those who demur from these particular judgments, let me urge that some very careful assessment of U.S. interests be made. We are unavoidably at a very critical moment in the development of space. What we do at this moment will have extensive consequences that we cannot expect to foresee in detail but we nonetheless should know will unfold over many decades to come. From his report it appears that the President finds it uncomfortable to make the clear choices that the situation requires. By now we should be sensitive to the great security disasters that have occurred in the past when political leaders attempted to postpone necessary decisions because they found them uncomfortable.

Senator WARNER. We will announce now that we will have an open session of this subcommittee at 2 p.m. At that time we will receive the testimony from Dr. Perle of the Department of Defense.

We are hopeful that you might be able to attend. If you wish to speak in rebuttal to anything presented by the administration, we will be open to receiving your comments.

Senator Bingaman?

Senator BINGAMAN. Let me ask about what Senator Levin was inquiring about earlier today in the hearing.

LOW ALTITUDE VERSUS HIGH ALTITUDE CAPABILITY

If it is your view that there are pieces of this Asat arms race which could be readily subject to arms control agreements, the administration, as I understand the report we received, makes no distinction between the various kinds of Asat capability as far as arms control is concerned.

It basically concludes it is not feasible to have arms control, or desirable perhaps, although I am sure they would argue about that second characterization, but it is not feasible at any rate with regard to the whole range of Asat capability.

They also make a distinction between low orbiting and high orbiting satellites and our questions I guess have tried to elicit from witnesses the extent to which they think those are meaningful distinctions that could be used to pursue arms control.

Dr. STEINBRUNER. I think there are meaningful distinctions that can be used to pursue arms control.

The Soviet Union system is restricted as a practical matter to altitudes well below those where our most important assets have been placed.

It appears to be a deliberate choice, on the part of the Soviet Union not to engage as yet at those altitudes. The Soviets could have done so by now had they so chosen. That is a very significant fact.

That means that we can restrict further development of Asat capability on both sides and protect to that degree assets at higher altitudes. That protection would not be absolute, but I think there would be a very great difference between the world as it would be under those restrictions and as it would be without them.

It would be a much more dangerous world, much more disruptive without it.

Senator **Bingaman**. That is the only question I have, Mr. Chairman.

Mr. **Buchheim**. Mr. Chairman, could I interrupt and perhaps introduce a varying note relative to my friend, John?

I think the question of low altitude capability versus high altitude capability in all respects is a technological question.

It is not a question of Soviet choices. Any antisatellite interceptor that has been tested at, say, 300 miles might or might not have an ability to operate at 3,000 miles and we simply do not know whether the interceptor the Soviets have tested so far does or does not have a high altitude capability.

This depends not so much on the interceptor; it depends on the ground support system which includes space track radars, communications, and so on, and even, God forbid, the radar at Ablakova which is much discussed.

So, whether or not the Soviets have a capability at low altitude or high altitude or whether indeed they have an operational capability at all depends on the ground support system.

In my opinion, they do not have an operational antisatellite capability because they have never tried the thing except an orbital inclination of 59° or thereabouts.

As to whether or not an agreement is reachable with them, again I can only give you an anecdote.

Three weeks ago in The Netherlands I met with the fellow who was the deputy head of the Soviet delegation in 1978 and 1979. He said some nice things, of course, as they always do, but he also said he has in his own office files of what happened in 1978 and 1979: United States expressions of view, Soviet expressions of view, and their internal analysis of how these compared; and his judgment, which I, frankly, share, was that we were very close to an agreement. We should pick up.

Senator **Bingaman**. Mr. Chairman, one of the other statements that I understand the administration to be making is that we would expect to go ahead and test our satellite capability, this homing device, in the fall.

Assuming that there is no legislative obstable to that, to what extent would that action or further development or testing of ours impair our ability to reach any meaningful arms control in this area?

Are we in a very time-sensitive situation here where there is an opportunity for significant arms control which will be significantly reduced in the future?

Mr. **Buchheim**. In my opinion, sir, the answer is no. If we go ahead with our test program, nothing is going to change that has had any significance and, in my opinion, we should go ahead with our test program.

I think the last thing the United States needs is to address this question in the next several years in the absence of any knowledge as to whether our preferred system will work or not.

That seems to me a very poor way to leapfrog.

Yes, test it; let's find out. If it works, fine, that is fine. That is contingency one.

If it doesn't work, that is contingency two.

I don't think we should stop.

Senator **Bingaman**. You would say the same thing about deployment?

I assume that that agreement would eliminate the need for any deployment.

Is that your position?

Mr. **Buchheim**. I would hope so. Again, I think the critical questions are not whether the thing works or not when launched in the F-15, but the ground-based support for it.

If we are able to detect the target satellite of interest, if we are able to determine that it is really a target of interest and that our machine will really do it in, those are very important things to know.

If the answer is "I don't know" to all those questions and if we do not have the ground support, et cetera, et cetera, then we are walking around in the fog.

To illustrate that with one simple statement: People talk about U.S. ability to shoot down satellites. Well, that really is a meaningless statement because one of the things about satellites is that you can shoot them, make a hole in them and they will not come down.

We have, among other things, many other things, in this field the question of damage assessment. Suppose we shoot at a satellite. We don't like the satellite and we think we have hit it. It won't come down, we are still left with the question of whether we have succeeded in our purpose or not.

It is a big, complicated, largely technological problem, not to mention the policy issues that you have already mentioned.

Dr. **Steinbruner**. Let me make a brief comment.

The Soviet Union is not in the habit of leaving military capability in doubt. If they had wanted Asat capability, we would have seen greater investment than we in fact have seen. The Soviets do not rely on marginal capabilities if they want to take on a mission.

They have not yet dedicated themselves to antisatellite missions. They could. In testing our system, if it is done in the context in which we are essentially refusing to negotiate on the matter, I think that would highly prejudice the possibility of an agreement.

Done in the context in which we are negotiating, a U.S. test may not have this effect. It is in the overall policy context itself rather than the test that matters.

PRESSLER AMENDMENT

Senator **Warner**. Mr. Ambassador, from your experience as a negotiator, I have the following question.

The Pressler amendment is in the nature of a freeze on everything, putting the United States in a stand-still posture in all aspects of Asat.

Again, would you prefer to be at the negotiating table knowing that our Nation is pursuing, at the time you are trying to resolve through negotiations an arms control agreement, would you prefer that they be preserved free to pursue all aspects of antisatellite or would you want to negotiate from the viewpoint of a freeze?

Mr. **Buchheim**. I will probably startle you, but my answer is I really wouldn't care one way or the other.

As a straight matter of technology and investment in national security, I think we should go ahead and test the thing that we have designed and built. I won't repeat the reasons.

As to negotiating matters, I really wouldn't care. In 1978 and 1979 the United States not only did not have a tested Asat system, we didn't even have a program. It didn't make the slightest bit of difference to the negotiations.

The Soviets are willing, I think John said this, I am not sure whether I am remembering what he said or hoping what he said, but the Soviets believe that the United States has the technological and industrial capability to do these things.

So, the fact that we do or don't have a program is a matter of indifference. It made no difference in 1978 and 1979. This goes back to the magic phrase "bargaining chips," which is a lot of nonsense anyway.

They believe we can do these things if we want to do them, no question about it.

Senator **Warner**. Our study of history here reflects that the Carter administration initiated the testing program in Asat and other aspects of Asat for the purpose of having the necessary bargaining chips at the negotiating table.

Mr. **Buchheim**. I don't think that is so, sir. That program was initiated under the Carter administration. I think the Carter administration, in all frankness, started a program because they did not want to have to be put under the accusation that they were not pursuing this matter diligently.

What bearing it might have had on the negotiation, the record does not say. All I know is what I said in those meetings over in the old Executive Office Building, which is, don't bother with it.

Senator **Warner**. Dr. Reis, do you have a viewpoint on the various subjects we have touched on?

Dr. **Reis**. All I would say is to Ambassador Buchheim's comments "Amen." I pretty much agree with everything he has said.

Senator **Warner**. Dr. May, do you have any comments? Otherwise, we will close on "Amen."

Dr. **May**. It is a good thing to close on. I will just add one thing.

During the time I was a member of the SALT negotiating team under President Ford, the subject matter was different.

I would say that the fact that the United States had another test and development program underway in the strategic areas was a help and that the resolution or law freezing all these things would have been a hindrance to the negotiation.

It is quite true, as Ambassador Buchheim said, the Soviet Union knows perfectly well we have the capability to develop Asat systems if we choose.

I think it would be a hindrance to the negotiation if there were a freeze on all these activities.

Senator **Warner**. Thank you, gentleman, very much for your participation on this important issue and for enlightenting this subcommittee.

[Subsequent to the hearing, Senator Carl Levin submitted the following questions to be answered for the hearing record.]

QUESTIONS SUBMITTED BY SENATOR CARL LEVIN

VERIFIABILITY

Senator **LEVIN**. Mr. Buchheim, you conducted the Asat talks in 1978. It is my understanding that progress was made during those talks. Can you outline whether the Soviets made any concessions in the area of verifiability, and whether you think they would be willing to make concessions now in that area?

Mr. **BUCHHEIM**. Progress was made. At the stages passed through in 1978 and 1979, the small volume of discussion of verifiability did not involve either side asking for or making any concessions. If the limitations incorporated in an agreement were considered by the Soviets to be in their interest, and certain of those limitations objectively required verification measures other than use of NTM--and were confined in scope to the specific tasks of verifying compliance with those specific limitations; then, yes, I think they would be open to making concessions as to verification.

SOVIET ASAT TESTING

Senator **LEVIN**. Dr. Steinbruner, isn't it necessary for the Soviets periodically to test their current Asat to have any confidence it would work when needed? Considering its poor performance record, wouldn't a ban on its further testing eventually mean the Soviets could no longer count on its utility?

Why wouldn't testing limits on it as well as other Asats be verifiable?

Dr. **STEINBRUNER**. The Soviet Union normally conducts operational tests of deployed weapons at regular intervals. It is supposed that such tests are undertaken not only to assess the physical performance of the weapons but also to train the crew that operates it. Given this practice, it is probable that the Soviets would consider the utility of their Asat system to be substantially degraded if further testing were to be precluded. Moreover, the willingness of the Soviet Union to adopt a unilateral test moratorium indicates that the capabilities of the current Asat system are not highly regarded and that there is as yet no firm commitment to the mission of attacking satellites.

Testing limits can be designed that would effectively prevent the development of militarily significant Asat capability and would be verifiable. In the case of ground based Asat systems using directed energy as a means of damaging satellites, some further development of verification capability would probably be required to support an agreement. It appears to be at least as feasible to develop this verification capability as it is to develop the weapons themselves.

Senator **LEVIN**. Aren't there alternatives to Asats to neutralize Soviet satellite capabilities important to waging a conventional conflict—their targeting satellites, for example? Can't we reduce U.S. radar and electronic signatures and negate their utility?

Dr. **STEINBRUNER**. Soviet ocean surveillance satellites that have been alleged to be important in waging conventional conflicts have only limited capabilities and it is reasonable to suppose that they can be jammed, deceived, and/or evaded.

Direct attack on these satellites does not appear necessary in order to neutralize their effects on conventional engagements.

MAKING SATELLITES SURVIVABLE

Senator **LEVIN**. There are several ways to make our satellites more survivable without deploying our own Asat. These include hardening our satellites against lasers and nuclear weapons effects (heat, electromagnetic pulse, etc.); manuvering capabilities; deployment of spares or rapid replacement capabilities aboard ICBMs or SLBMs; orbiting spares in space. It is true that no single measure is successful against all threats, but while we have spent 100's of millions of dollars in past years studying how to make satellites more survivable, we have done little except in the last couple of years to implement these measures.

Dr. Steinbruner, wouldn't you think it would make more sense to spend the $3.9 billion we intend to spend to deploy our low-orbit Asat on implementing these other survivability measures?

The administration contends such other measures would take too long to implement—as long as 15 years by some estimates. What is your assessment of this issue?

Dr. **STEINBRUNER**. I believe that prudent measures to protect U.S. satellites against nuclear weapons effects and directed energy are certainly desirable. It appears that the measures taken so far are inadequate and that substantial improvements in protection are both feasible and desirable. These measures of protection should be undertaken whatever else is done. In designing and implementing such measures, it should be recognized that absolute protection cannot be achieved and that some optimum balance must be established since the measures of protection are costly and tend to interfere with the efficient performance of a satellite's primary functions.

With regard to attack by conventional explosives and physical projectiles, both of which require a dedicated weapon approaching to close proximity or direct impact, by far the best means of protection is the prevention of such weapons by arms control measures. It appears unlikely that effective protection could be provided at feasible cost in the absence of effective restrictions on Asat weapons of this type. Hence, I believe an Asat agreement is a necessary component of any program to protect U.S. satellites. In the absence of restrictions on the development of Asat systems, U.S. satellites in the long run are likely to become irretrievably vulnerable.

Senator **Warner**. The subcommittee is adjourned. We will resume at 2 p.m.

[Whereupon, at 12:58 p.m., the subcommittee recessed, to reconvene at 2 p.m., the same day.]

AFTERNOON SESSION

The subcommittee met, at 2:21 p.m., in room SR-222, Russell Senate Office Building, Senator John W. Warner (chairman) presiding.

Senator **Warner**. The chair wishes to apologize for being late.

We will now receive the testimony of Secretary Perle.

STATEMENT OF RICHARD N. PERLE, ASSISTANT SECRETARY OF DEFENSE (INTERNATIONAL SECURITY POLICY)

Mr. **Perle**. Thank you very much, Mr. Chairman.

I am grateful for this opportunity to return to this subcommittee to continue our discussion on antisatellite [Asat] arms control and the U.S. Asat Program.

Since I last appeared before you, the President has issued his report on U.S. Policy on Asat Arms Control. It is a comprehensive report which provides a large amount of data to support an informed debate on this issue.

It also sets forth a policy which, I hope, you will be persuaded is in the best interest of the United States and its allies.

The report concludes that:

> No arrangements or agreements beyond those already governing military activities in outer space have been found to date that are judged to be in the overall interest of the United States and its allies.

However, the report also notes that, guided by the criteria contained in the President's Space Policy announced on July 4, 1982:

> The United States has been studying a range of possible options for space arms control, with a view to possible negotiations with the Soviet Union and other nations, if such negotiations would serve U.S. interests.

As I noted in my last appearance before you, the reasons why the administration has been unable to recommend Asat arms control measures include the unverifiability of proposed measures, the difficulty of defining Asat systems in a comprehensive way that would effectively limit threats to United States and allied satellites, and the threats posed by Soviet targeting and reconnaissance satellites that undermine conventional and nuclear deterrence.

Each of these factors is discussed at length in the President's report, and I will not go into great detail about them here.

I would like, however, to say a few words about verification, since it is sometimes argued that concern about verification is simply a pretext for avoiding arms control agreements that are, in fact, opposed on other grounds.

I can assure you that our concern about the verifiability of an Asat arms control agreement is genuine.

As the subcommittee is aware, we are talking about the survivability of a relatively few, but vital, U.S. satellites. From this point of view an unverifiable treaty is far worse than no treaty at all.

Under an insufficiently verifiable treaty, the Soviets would be able to develop and maintain a covert capability to attack those vital satellites.

For example, a small covert supply of Asat interceptors would be enough to do a disproportionate amount of damage to our space assets, since these could be launched using boosters that the Soviets could legitimately maintain for other space purposes. Similarly, given the wide range of space systems, including some nonweapon systems, that could have an Asat capability, the opportunities exist to develop an Asat capability in the guise of something else; even if the tests of this capability were detected, there would be considerable difficulty in distinguishing the Asat capability from an innocuous civil or military capability which it resembled.

This goes to the point, Mr. Chairman, of the difference between monitoring and verification. We had discussions this morning in closed session about the technical capability to monitor Soviet development.

But we have learned, and I believe this committee knows, having shared the experience with us, that there is an enormous difference between collecting data about Soviet programs and being able to verify compliance with an agreement since the data invariably are ambiguous, open to multiple interpretations, and the treaties are seldom precise enough to give a decisive answer on the basis of monitoring judgment as to whether or not the violation has occurred.

Sometimes when we have abundant information, it is information that cannot be used in a public forum to establish beyond doubt that a violation has taken place.

The problems of monitoring are difficult to begin with and the problem of verification even more difficult.

In the presence of a ban on antisatellite weapons we would be most likely to relax on unilateral efforts to make our satellites more survivable and would, of course, find that funding for these efforts was difficult to obtain in the absence of hard evidence of Soviet cheating.

I understand that earlier this morning Mike May drew attention to the importance of protective measures. It is difficult to spend money on protective measures in circumstances where a ban or a threat is presumed to exist.

Furthermore, we would not be able to deter Soviet attack on our satellites during a crisis since we would not have developed an operational Asat capability of our own.

The modest capability that we are seeking has as its principal function assuring that if the Soviets were to attack and destroy American satellites, we would be in a position to respond in kind, and because we would be in a position to respond in kind, we believe the Soviets will be deterred from using whatever capability they may possess in the first instance.

So, we believe that that deterrent element in our own program is vital to assure the protection of our own satellites together with those other protective measures that we can and should invest in providing.

For these reasons I think it is those who most worry about the survivability of our satellites who should be most wary of an insufficiently verifiable Asat agreement.

I have kept these remarks brief. I believe the President's report speaks for itself and I will be happy to respond to any questions.

Senator **Warner**. We will hear from Dr. Cooper next.

STATEMENT OF DR. HENRY F. COOPER, ASSISTANT DIRECTOR, STRATEGIC PROGRAMS BUREAU, ARMS CONTROL AND DISARMAMENT AGENCY

Dr. **Cooper**. I welcome this opportunity to elaborate on the administration's arms control policy regarding the testing, development and deployment of antisatellite weapons. This policy was provided to the Congress in unclassified and classified reports earlier this month. These reports were written by an interagency group involving all the Government agencies with responsibility for our military and civil space programs and was cochaired by Mr. Perle and myself.

While we worked many long hours and had many heated discussions, I can honestly report to you that the report is supported by all the participating agencies so that it, in my view, represents a balanced response to the requirements of the 1984 Defense Appropriations Act.

I should also add that our work as an interagency group is not done; and as pointed out in that report, we are continuing our studies of possible arms control initiatives that would be verifiable and in our national interest.

As you know, these policy deliberations involve some of the most sensitive national security programs and capabilities. In recognition of that fact, and in order to be responsive to the congressional questions, we submitted our report in both classified and unclassified versions so that a full discussion with the appropriate committees might follow, with the most possible information available to support our discussion in closed hearings.

In keeping with that pattern, Mr. Chairman, I would propose to make a few comments on the bottom lines of our policy and then request that we go into a closed hearing so that we can respond fully to any questions that you and your committee may have with respect to the policy.

I should begin my discussion by pointing out that the United States seeks the use of space for peaceful purposes, for the benefit of all. These uses include national security activities to strengthen deterrence and prevent aggression, regulated by equitable and verifiable arms control agreements that reduce the risk of conflict and that are compatible with U.S. national security.

With that objective in mind, we have been studying a range of possible options for space arms control with a view to possible negotiations, if such negotiations would serve U.S. interests.

Our reports go into the results of our studies, thus far, in more detail than time will permit me to cover today, so I would like to use my time to highlight several important bottom lines that I believe deserve the most interest.

First of all, I would note that, as discussed in prior closed hearings with this subcommitte and as summarized earlier this morning, it is important to understand that substantial Soviet space programs threaten our space assets and our ability to successfully conduct terrestrial military and civil operations.

We need to deter hostile threats to our space systems. We also need the means to deny the Soviets any perceived advantages their space systems might provide their terrestrial forces, thereby improving deterrence with respect to conventional conflict that might, for example, involve the Warsaw Pact.

Consequently, since these military capabilities exist in some abundance in space already, we need to understand that space is not a sanctuary today and that it is unreasonable to expect arms control initiatives to make it a sanctuary tomorrow.

This points out an essential need for a vigorous and continuing program to improve the survivability of our satellites independent of whether or not we are able to devise space arms control agreements that are in the U.S. interest.

I would like to applaud Dr. Mike May's comments this morning with respect to the requirements for space systems survivability. However, as one who was once responsible for overseeing the Air Force's space systems survivability program, I would point out it is a difficult task to maintain adequate funding in support of such programs. I would urge members of this committee to look carefully into this area.

There are many existing and potential Asat capabilities—some inherent in the function of systems built for other purposes such as the GALOSH ABM system, ground-based lasers, manned space capabilities, and so on. Consequently, we judge that there is no way to adequately verify a comprehensive ban that would seek to eliminate all ways to counter satellites, and here I emphasize the word comprehensive.

Whether or not limited bans of specific systems would be adequately verifiable and in our interest is being studied along with other less ambitious arms control arrangements. Asat arms control agreements must be verifiable with high confidence because of the relatively large impact a small degree of cheating could have on countering functions performed by relatively few satellites.

In following up on the above comments, I want to emphasize that we need to improve our language on this subject if we are to enhance the communications between experts and avoid misleading the layman.

For example, we should not use the word "comprehensive" or various surrogate language when discussing limited restraints. The loose use of the term "comprehensive Asat ban," in conjunction with the discussion of the United States direct-ascent Asat and the Soviet orbital Asat greatly confuses the discussion, and, in our view, is very misleading to the layman who could perceive those particular Asat's as the only Asat capabilities under discussion, completely missing the point that many other Asat capabilities exist.

Furthermore, in our discussions of future arms control arrangements, I believe we should cast space arms control in its rightful role of attempting to regulate the inevitable exploration and use of space to ensure an equitable and stable balance of force capabilities between East and West.

The central issue, it seems to me, is to compare life under possible limited agreements with appropriate safeguards and life with the continued status quo without additional restrictions beyond those that already exist under international law and various agreements.

We are examining this question in our continuing study of more limited arrangements than comprehensive Asat bans that might ban or otherwise limit specific weapon systems or regulate certain threatening activities related to space.

In this regard I was confused a bit this morning by a comment that the President's report had ruled out all arms control. I believe there is a misperception.

For the record I would like to read a statement from President Reagan's cover letter and just note that on pages 1, 4, and 15 there are a number of places that point out the fact that we indeed intend to consider more limited kinds of Asat arms control agreements.

From the President's letter; the following statement was highlighted:

> However, no agreements beyond those already governing military activity in outer space have been found to date that are judged to be in the overall interest of the United States and its allies.

From the next paragraph, the point at issue seems to have been missed:

> Notwithstanding these difficulties, the United States is continuing to study space arms control in search of selected limits on specific types of space systems or activities in space that could satisfactorily deal with the problems such as those described above.

I also would like to read from the third paragraph on page 4:

> The fact that Asat capabilities are inherent in some systems developed for other missions or are amenable to undetected or surreptitious development makes it impossible to verify compliance with a truly comprehensive testing limitation that would eliminate tests of all methods of countering satellites. Test bans for a more limited class of Asat systems may be verifiable, and these are being studied to determine if they are in our national interest. The breakout potential of that limited class of Asat systems is very troublesome and creates doubt that limited test bans could be effective.

Senator LEVIN. What page is that on?

Dr. COOPER. That is on page 4.

I want to set the record straight that the report does not rule out all arms control arrangements.

We have made a special effort to try to clarify the language with respect to comprehensive bans. The lack of precision in discussing a comprehensive ban has confused the debate both within the Government and in public. The term has been misused for some period of time. The word "comprehensive" has been used as a surrogate for limited. You can't avoid confusion when such liberties are taken with the language.

Finally, Mr. Chairman, I would like to thank you and Senator Exon for your thoughtful and supportive comments following receipt of our report on the 2d of April. We do, indeed, hope that our report will make a significant contribution to an informed and constructive congressional debate and we pledge to be responsive in every way that we can.

Senator WARNER. Thank you.

Senator Bingaman, you may proceed.

Senator BINGAMAN. Thank you, Mr. Chairman.

Let me ask Secretary Perle if I understood one of his comments. I don't have a copy of your testimony, so I can't quote it to you.

Mr. PERLE. It will be available shortly, Senator, and I apologize for the tardiness in providing it.

Senator BINGAMAN. As I understood, what you said was one of the reasons we should not pursue arms control or one of the difficulties with pursuing arms control is that a ban would make it difficult to obtain funding to improve survivability.

That is an unusual argument. I have been here a little over a year, but I have not heard anyone argue that arms control should not be pursued because it might impair the ability of the administration to obtain funding from the Congress.

Is that your position?

Mr. PERLE. Yes, Senator. Past experience has shown that the diminution in the sense of the threat that follows arms control will make it very difficult to obtain funds for protective measures.

Senator BINGAMAN. If you take that argument to its logical conclusion, then your view would be that whatever actions we might take to diminish the perception of threat are counter productive to our national security.

Is that accurate?

Mr. PERLE. I would not take it to that conclusion. I was commenting specifically on the matter of arms control with respect to antisatellite weapons.

The experience to which I referred, one that was a very personal one, one of the first assignments I had when I came to the Senate staff in 1969 as a very young staffer, was to prepare an annual report which went from the Armed Services Committee to the executive branch on the implementation of the four safeguards that had been agreed upon at the time that the treaty banning test of nuclear weapons in the atmosphere was signed between the United States and the Soviet Union.

At the time and as a condition of ratification of that treaty, the Congress, not the executive, has insisted upon, and the executive has agreed to, a series of measures that would make it possible for us, in the event that the Soviets violated the atmospheric test ban, quickly to resume atmospheric testing of our own because it was believed at the time that this would be an important deterrent to have this capability rapidly to respond to a Soviet violation.

For a number of years thereafter we did in fact maintain a safeguard program and money was put every year into the budget in order to maintain a readiness to test.

I don't think anyone prepares that report any more. It has been forgotten. I am quite sure that the money has disappeared and some of the safeguards we agreed to no longer exist.

I believe, Senator, that this is almost inevitable, that having agreed to the atmospheric test ban, having become accustomed to it, we are no longer in the position, should the Soviets conduct atmospheric tests, to respond rapidly with tests of our own.

And when it has not proven to be in the Soviet interest to violate that ban, that deterrent, that at the time was keenly felt was necessary, is no longer felt to be necessary.

So, if you can accept it as that, a comment in this context based on some past experience that suggests that vigilance is difficult to sustain under some circumstances.

Senator **Bingaman**. As I understood Dr. May's comments this morning, he was saying that he thought we should go forward simultaneously with improving the survivability of our satellites and also with efforts for arms control.

I take it that your argument is that we should not pursue the arms control until the survivability problem is dealt with because pursuing the arms control may jeopardize the ability of the administration to get funding from the Congress to pursue survivability?

Mr. **Perle**. That is an element. If everything else about the ban on Asat commended itself to our interests, I don't think that would be a decisive factor in and of itself. But added to the other problems we see, it seems to me to be worthy of mention. I think the problem exists in some other areas as well.

Frankly, it is often difficult even within the executive branch to obtain sufficient funds in the budget for certain kinds of survivability measures.

It is true with respect to chemical weapons. Senator Warner well knows the military services simply don't like to spend money on protective gear with respect to chemical weapons, building protection into vehicles and other weapon systems, when the same funds are in competition with other programs.

They do it, but they do it reluctantly. I believe the same thing is true of protection of our satellites. That is perhaps one reason why many of our satellites are virtually unprotected. It is an insurance policy. It is tough to get money to spend on insurance when you also have to pay the rent.

So, I think it is in the nature of things that some of these investments are always difficult and will become even more difficult if one were to become complacent because an arms control agreement was in effect.

If the agreement is a very dicey one, difficult to verify and of uncertain effect in wartime, then I think some added dangers result from having dropped one's guard.

Senator **Bingaman**. I will go on to another line of questioning, but let me just say that I find it fairly disturbing that one of the justifications we are being given for spending more money and pursuing this weapon system, one of the justifications for not seeking any arms control is that it might interfere with our pursuit of the weapon system and spending more money on it.

I find that kind of argument disturbing.

PROTECTIVE MEASURES FOR OUR SATELLITES

Mr. PERLE. Please be careful not to misinterpret—I was talking about protective measures to our satellites.

Second, I believe because of the importance of the satellites that we have in space, we need to be able to deter a Soviet attack against them.

The best way to do that is to be able to respond in kind. My remark was—perhaps I should not have made it in passing—was a limited point. That is, if we have an arms control agreement, it is highly likely that we would spend less on protective measures for our own satellites than in the absence of an arms control agreement.

Senator BINGAMAN. I thought that was one of the benefits of arms control, you got away with spending less on the weapons systems and the other military activities.

Let me pursue another issue here.

As you indicated, our satellites are largely unprotected. As I understand it, the Soviets' coorbital system has been operational since maybe the midseventies.

What have we done to protect our satellites during this period?

It strikes me unusual, we get testimony as to the invulnerability of these satellites to really an awful lot of low power types of threats, and I am not trying to get into anything classified, but how is it that we have not been planning ahead in this area?

Why all of a sudden in 1984 is there a tremendous need to counter this operational capability which has been around since 1974?

Mr. PERLE. I will ask my colleague to answer in greater detail since he actually has had some management responsibility in this area.

I think the threat has been recognized for some time. The program dates back many years as well. It has only now become a prominent feature of the public debate.

Within the Department of Defense there has been recognition of the vulnerability of our satellites for some time. It is a difficult problem to solve.

There are areas in which the advantage is so overwhelming from an offense that counteroffense is probably the best defense. That is certainly one of those areas.

Hank Cooper knows a good deal more about the programmatic side than I do.

Dr. COOPER. It is difficult, first of all, to get into specifics of our systems' vulnerability in an open hearing; and in particular to discuss survivability improvement measures that we are taking.

It would be a mistake to say that there are no survivability measures that have been made for our systems. I made the comment earlier that as one who has had responsibility for those programs, I was not generally happy with the level of support they received.

I believe that in fact the architecture that has been persuasive in the design and in the evolution of our space systems has been largely oriented toward peacetime. The general argument for cost effectiveness, and so on, tends to undermine the inclusion of adequate survivability measures during the early stage of development when such measures would be least expensive, as Dr. May said this morning. Retrofit or later modification programs, by comparison are terribly expensive. Unfortunately, our peacetime orientation largely undermines the expenditure of the money for insurance, for survivability measures, as Mr. Perle mentioned earlier.

Senator BINGAMAN. When I run out of time, just yell, Mr. Chairman.

Let me ask if one of the issues that keeps being discussed in these hearings on Asat is the issue of whether we are more dependent upon our space assets or the Soviets are more dependent on theirs or who has the most to lose if these space assets were to be destroyed or damaged.

I would be interested in either of your views on that issue, whether you would agree that the United States is more dependent upon the survival of our space assets, and so on.

Mr. PERLE. My own view would be that it would depend very much on the situation you envision. If the issue were a conventional war in Europe in which the United States was operating over very long supply lines, reinforcing our European allies, that would be quite different from a central strategic war in which the issue was the command and control of strategic forces.

I don't think there is any single answer that can be given to that question. We both depend heavily on satellites for communications and command and control and for other purposes.

The Soviets have gone rather further than we have in the development of some satellites that bear on conventional war which are highly advantageous to them.

On the other hand, we would be in serious need of communications over those long supply lines. I think it is a difficult question to answer in general.

Senator BINGAMAN. Some of the testimony we have received made the point or tried to make the point that there are parts of antisatellite weaponry, specifically the rocket booster, parts that are much more subject to verification and more subject to arms control than perhaps other parts.

If that is true, why aren't we pursuing arms control in that particular weaponry?

Is it because we still think the verification problems are insurmountable or whether we think it is contrary to our interest to achieve an arms control agreement in that area?

Mr. PERLE. Again, Hank may want to say more, but we are, as the President's statement indicated, continuing to study areas where some fruitful arms control may be possible.

I think it is fair to ask whether arms control in this and any other areas is an end in itself. We take the view that arms control agreements are useful if they contribute to our security.

They are not useful if they do not contribute to our security. And choosing the one system, the one flight test program that it is possible to verify and making that subject to an arms control agreement, if in fact the Soviets have a dozen other ways of attacking the same satellites, it seems to me not a terribly productive outcome.

It smacks a little bit of arms control for its own sake. If there are verification problems on top of that, it may well be the case that it is unwise to proceed even though in theory some elements of the problem are more amenable to verification than others.

To take the current suborbital system, the flight testing of which I will agree is rather more amenable to monitoring than are other approaches of Asat, the Soviets already have the system tested and deployed.

It is undoubtedly the case that over time confidence in that system would decline if they were unable to test it further because an agreement prohibiting the testing had been reached, but the confidence would not go down to zero and they have the system in hand.

So, we would face under those circumstances, the possibility that in a war we might see the emergence of that very system even though it had not continued to be flight tested past the point at which the agreement went into effect.

That in some ways is the best case, the coorbital system, because it does require launch vehicles which we can identify, and so on. So, I think the real question is, is there much advantage in an agreement that prohibits one or two of a dozen ways of accomplishing the same purpose?

It is not self-evident to me that it is advantageous.

Senator **Warner**. Conversely, are we deceiving the public if we endeavor to encourage or try to seek arms control in one or two areas, knowing full well that the Soviets have other systems? Would not our adversaries be tempted to allocate funding on the other systems and just eliminate the funding on the ones subject to agreement?

Mr. **Perle**. Indeed. I suppose the announcement one would have to make to the American people upon completion of the very partial agreement that such an agreement involving only the Soviet coorbital system and let us say our miniature vehicle system, we have good news and bad news.

The good news is that we have just banned antisatellite weapons on each side.

The bad news is that there are a dozen other ways that the Soviets can destroy our satellite.

Senator **Warner**. Dr. Cooper, the statement of the Secretary goes to the very heart of this issue.

Do you wish to concur, differ, or amplify?

POTENTIAL OF TEST BAN AGREEMENTS

Dr. **Cooper**. I am in general agreement with the statement. As my formal statement indicated, we are in fact looking at the potential of agreements that might ban the testing of certain classes of satellite capabilities.

Once you get away from discussing bans of the existing coorbital capability or the miniature vehicle, the next subject that is usually discussed is a high-altitude ban of such systems. I believe it would be possible to monitor testing of such systems at high altitude and therefore such a ban may be verifiable.

The question then turns on whether or not such a high-altitude ban would be in our national interest. In that context, one has to deal with the subject of breakout, and one must worry about the inherent capabilities of either the Soviet coorbital antisatellite system or miniature homing vehicle to be developed for antisatellite application at high altitude. It is not really a very big translation of existing capability to go from low to high altitude since what would be primarily involved is an improved booster capability. Since the Soviets have amply demonstrated booster capability, breakout potential is significant. There are other aspects dealing with a high-altitude ban which I would prefer not to discuss in this open hearing.

There are similar issues needing debate as we examine the possibility and difficulty of a possible agreement that might limit each side to a single interceptor-type Asat, for example the miniature homing vehicle on our side and coorbital antisatellite system on the Soviet side.

As Secretary Perle pointed out, the Soviets have had a demonstrated capability for something on the order of 10 years. The number of tests that have been conducted with that system have been spread out over that 10-year period. I don't know that our reliability estimates for their system have varied considerably over that time, a portion of which contained a substantial interlude between testing. Suggesting a ban of such a system for which it is impossible to monitor the production—we don't know how many such coorbital Asat's they have—somewhat boggles the mind when one considers verification issues. I would conclude that such a ban is not verifiable. A high altitude ban may be, but we have the breakout and other issues to contend with.

Senator WARNER. On that point, the verification of what specific types of high altitude Asat is possible?

What about directed energy?

Dr. COOPER. I was speaking specifically of the interceptor Asat's that use kinetic energy or momentum kill mechanisms. I completely concur with your point earlier about misleading the public, and I apologize if I have not been clear on the point that I was discussing only one of many kinds of Asat capabilities. Our concern for this point is why we have hit so hard at this issue of a comprehensive ban and are trying to get people to use Webster's definition of the term "comprehensive" because the man in the street is deceived if we do otherwise.

Senator WARNER. The man in the street shares the view that many of us hold, including myself, in hoping that a comprehensive ban might be achievable. I had hope that the concept of a sanctuary in space might be brought to fruition, but, indeed, the testimony today has thrown an entirely different perspective on this subject than the preceding hearings, and a different one than personal studies I have engaged in since that time.

If we are successful in turning back efforts to accept the Pressler amendment, it may be a disappointing victory.

Mr. Levin, I would hope to conclude this hearing prior to our adjourning for this vote. Would you like to ask some questions?

Senator LEVIN. I would, indeed.

Mr. Perle, first of all, would you agree that some aspects of a satellite may be verifiable?

Mr. PERLE. Yes; I think some might be.

COMPREHENSIVE BAN

Senator LEVIN. The impression which the press got from your statement in March is somewhat different from that.

In the New York Times on March 16:

> A Pentagon official told the Senate today they believe it would be extremely difficult, if not impossible, to verify if the Soviets would comply with any treaty to prohibit weapons capable of destroying satellites.

Did you make it clear in that statement you were referring to a comprehensive ban?

Mr. PERLE. I would repeat that statement. I think the element that could conceivably be made verifiable would not amount to an effective treaty at all.

Senator LEVIN. Did you make it clear at that time you were talking about a comprehensive ban?

Mr. PERLE. I hope I did.

The point I am anxious to make is that I don't think it accomplishes very much to get the ban so partial that the problem remains essentially unsolved.

Senator LEVIN. That is a very different point, whether or not a partial ban is in our national interest is a different point.

The first question is: Is it possible we can devise a partial ban that is verifiable?

Mr. PERLE. It may be, although it would be nothing more than a ban on some activities.

Senator LEVIN. Obviously, that is what a partial ban means. If you know now it is not in our national interest, why are you still studying it?

Mr. PERLE. There is a strong desire, if we can, to find some limited measures that would be helpful to examine more thoroughly.

For example, there are those who so believe and it is still being studied.

Senator WARNER. You are talking at cross-purposes. I listened very intently. You seem to say you might carve out an area, but then there are a dozen others that can effectively do the mission.

I am listening carefully to this response.

Mr. PERLE. I stand by that. There are measures short of bans on systems for destroying satellites that may be of some interest.

I have my doubts personally, for example, prohibited acts in peacetime are thought by some to be a benefit.

Senator LEVIN. Would you agree that test bans for more limited classes of Asat systems might both be verifiable and in the national interest? Would you agree with that?

Mr. PERLE. I have not, myself, seen the suggestion put forward that meets the two tests of verifiability and national interest.

Senator LEVIN. My question is: Is it possible that these bans for a more limited class of Asat systems may be both verifiable and in our national interest? Is it possible?

Mr. **Perle**. I would have to answer that question both by saying yes it is possible and at the same time saying that answering in the abstract is not very useful.

Senator **Levin**. Why are we making the statement in the report you are giving us saying exactly that?

Mr. **Perle**. Because we have not found a ban that makes any common sense that is both verifiable and in the national interest.

Senator **Levin**. Why represent that you are studying it?

I am reading your report, "test bans for more limited class Asat systems may be verifiable. These are being studied to determine if they are in our national interest."

What are you telling us that for?

Mr. **Perle**. Nobody wants to close the book forever. Not all the world's wisdom has been accumulated.

Senator **Levin**. That is the extent of your study?

Mr. **Perle**. There are studies going on. You asked for motivation for the study.

Dr. **Cooper**. Can I comment briefly on that?

The study is going on. It is not complete. I have already mentioned to you that I have some reservations with respect to some of the bans under consideration as well. I believe that the interest of all of us is served by doing a thorough job.

Senator **Levin**. Basically, you don't get your hopes up?

Dr. **Cooper**. I don't know how the study will come out. If I knew how it was going to come out, I would not tell you we were still studying the problem.

Senator **Levin**. Is it that it may be both verifiable and in our national interest?

Dr. **Cooper**. There is a chance.

Senator **Levin**. Is it a reasonable prospect?

Dr. **Cooper**. You are pushing me into a corner that I am not sure I want to get into. We are still doing the study. Also, as Mr. Perle indicated, we are looking at other kinds of activities.

ASAT BANS ARE NOT VERIFIABLE

Senator **Levin**. I want to keep pushing you because I think it is important. There has been an impression which has been cast pretty broadly here in articles that, first of all, Mr. Perle is saying basically, according to the article—I have not looked at the testimony—basically Asat bans are not verifiable. That is the impression.

Dr. **Cooper**. I thought the quote, as you stated, referred to a treaty that would prohibit antisatellite weapons or something like that, implying that it was a broad scope or comprehensive ban—not a limited or partial ban.

Senator **Levin**. It may be the fault of the newspapers, I don't know. I am going to go back and read your testimony.

Are you saying there is a reasonable possibility or there isn't?

Dr. **Cooper**. I think it may be possible to define a class of Asat's so narrowly that you can with confidence monitor the testing.

Senator **Levin**. And it might be in our national interest?

Dr. **Cooper**. I reserve judgement until I do the study. I am a technical guy. I don't tell you the conclusion and then do the study.

That study is still underway. There are issues to be dealt with; breakout is one of them, as I have mentioned. There are other issues that have to do with things that I really don't wish to discuss in an open hearing.

Senator **Warner**. In terms of arms control, suppose you are able to strike that agreement and verify, of what value is it if there are dozens of other systems?

Dr. **Cooper**. There may not be much value, but I wouldn't object if we were honest with the public; that we were clear about what we were doing and not claiming to do more than what we were doing.

Senator **Warner**. What is the sense of doing a futile act if you are able to isolate one or two systems and there are a dozen others?

Mr. **Perle**. That is my personal view. You hit the nail on the head.

Senator **Levin**. Isn't it possible you can create defenses against some systems that you can't verify the elimination of?

Dr. **Cooper**. It may be possible.

Senator **Warner**. Mr. Levin, you and I had better vote.

Senator **Levin**. I have additional questions. I would rather miss the vote and have an opportunity to ask them unless they can stay on.

Senator **Warner**. Could you gentlemen accommodate the Senator by waiting?

Mr. **Perle**. Surely.

[Recess.]

Senator **Warner**. Senator Levin, would you please proceed.

Senator **Levin**. I want to go back if I can to the report.

I think it is really a critical issue. It is a report to the Congress on March 31 and the representation that test bans for a more limited class of Asat systems may be verifiable and ways are being studied to determine if they are in our national interest.

First, let me just ask you, Doctor, does that imply clearly to you that such limited test bans may be in our national interest?

Dr. **Cooper**. I would not have agreed to the report if I didn't think there was a chance they might be.

Senator **Levin**. Mr. Perle, do you agree with that?

Mr. **Perle**. Yes. I am not going to rule something out forever.

Senator **Levin**. Now your testimony on March 15, Mr. Perle, was as follows.

> I would like to confine the categoric statement that I believe a ban on antisatellite weapons is unverifiable. Beyond that there are other military activities in space that pose varying degrees of verification problems.
>
> One should not want to overgeneralize with respect to development of antisatellite capability that I believe a ban would leave us unable to verify Soviet compliance.

Would you agree today that a limited ban on antisatellite weapons or partial ban on some antisatellite weapons may be verifiable?

Mr. **Perle**. Yes, I would agree.

Senator **Levin**. Any impression that you gave at that time that bans are unverifiable would not have been intended to refer to the partial or limited ban?

Mr. PERLE. Yes. I think that is because I tend to conceive of the problem in the broad sense of whether it is possible to develop an arms control solution and the threat posed by an array of Soviet capabilities that could be used to attack satellites.

We have been unable to find such a solution.

Senator LEVIN. That does not mean that there is not one.

Mr. PERLE. Our best judgment is that there is not a broad solution to a broad problem.

Senator LEVIN. But there may be a narrow solution to a partial problem.

Mr. PERLE. There may be a narrow solution. Whether it is a solution to a problem or not is a matter of judgment.

Senator LEVIN. You have not concluded that judgment yet?

Mr. PERLE. I am rather doubtful personally that banning, even if it can be made verifiable, one or two out of a dozen possible systems that can be used to attack satellites would accomplish very much.

Senator LEVIN. I understand your doubt, but have you reached any firm resolution of those doubts?

Mr. PERLE. As of now, I have been unable to find a proposed ban that makes much commonsense.

Senator LEVIN. Doctor, have you reached any firm conclusion yet relative to that issue?

Dr. COOPER. No, sir.

REPEALING THE TSONGAS AMENDMENT

Senator LEVIN. Relative to the Tsongas amendment, the Tsongas amendment says that:

"No funds can be expended to test any U.S. Asat against an object in space unless the President certifies that the United States is endeavoring in good faith to negotiate a mutually verifiable Asat ban."

Does the President intend to seek either an amendment or repeal of the Tsongas language?

Dr. COOPER. I don't know what legislative strategy the administration will develop.

Senator LEVIN. You have not discussed that matter?

Dr. COOPER. Not with the President.

Senator LEVIN. Has that been a matter in terms of recommendation to the President?

Dr. COOPER. I believe there are some of us who believe the principal effect of the Tsongas amendment is to terminate an American program that we believe to be necessary and, therefore, would like to see it repealed.

Senator LEVIN. Has there been a decision yet relative to the recommendation to the President?

Dr. COOPER. I am not aware of any.

Senator LEVIN. Doctor, do you believe we should amend or modify the Tsongas amendment or repeal the Tsongas amendment?

Dr. COOPER. As I understand the Tsongas language, it refers to a comprehensive ban and I believe I have made my views clear that such a ban is not verifiable or in our national interest. If that interpretation is correct, then I believe we should try to repeal the Tsongas amendment.

Senator LEVIN. Another question relates to our allies. Have our allies been briefed on this report, the conclusions, and do they concur?

I am referring to the March 31 report to the Congress on Asat arms control.

Mr. PERLE. The Ministers of Defense of the NATO Alliance were briefed on the principal findings and conclusions of the report at the last meeting about 10 days ago.

Dr. COOPER. Yesterday I was in Brussels and spent most of the day, until I caught the plane to come back here, meeting with the Disarmament Committee of Experts reviewing the administration's report and our views on this. I can't speak for the final conclusions of the meeting because I left while it was still in session. I look forward to reading the cables. However, I think it is useful to note that during the question and answer period a number of the representatives did in fact agree with our view that comprehensive bans are not verifiable.

Senator LEVIN. Can we make a statement relative to our allies' position on a partial ban?

Dr. COOPER. I cannot.

Mr. PERLE. I am not sure that the allies have had time, Senator Levin, to work their way through this problem.

Senator LEVIN. Can we make any statement that all of our allies would oppose a comprehensive ban?

Dr. COOPER. No, sir. I would not want to speak for our allies because, as I said, I left in the middle of the meeting. I gained the impression from the comments of a few of them who spoke out during the session.

Mr. PERLE. In fairness to our allies, some of whom have urged that we attempt to negotiate a comprehensive ban, they have not had the opportunity to examine some of the elements and other problems that have now begun to show up.

Dr. COOPER. If I may say another word, I would note that one of the representatives followed his observation that a comprehensive ban would not be verifiable with a pertinent question. He said, would it not be better to pose the question as to whether or not the world would be a better place with some limited arms control restraint than it would with the status quo without constraints other than those already in existence. That perhaps is the proper way to examine the alternative proposals before us. I took his observation as an enlightened view because that in fact is my own view.

Senator LEVIN. The Tsongas language, Dr. Cooper, states that "The President must determine and certify that the United States is endeavoring in good faith to negotiate with the Soviet Union a mutual and verifiable ban on antisatellite weapons."

Does that apply to an all or partial ban?

Dr. COOPER. I have asked our legal counsel this question. My understanding is that from the discussion on the floor and otherwise, the Tsongas amendment refers to a comprehensive ban.

Senator LEVIN. Is there a legal opinion to that effect floating around?

Mr. **Graham**. No formal legal opinion as to whether it is comprehensive or limited.

Mr. **Perle**. I have the feeling that if the administration had come to the Congress to say that we are prepared to attempt to negotiate a ban on some antisatellite systems, but not others and if we define very narrowly the antisatellite systems that we were prepared to negotiate a ban with respect to, and then proceeded to spend the funds encompassed by the Tsongas amendment, I expect Senator Tsongas would take the view that we were not sufficiently comprehensive and it violated the intent of his amendment to go ahead and spend the funds on that basis.

Senator **Levin**. Have you discussed with Senator Tsongas whether or not his language was intended to refer to all or partial ban?

Dr. **Cooper**. I have not.

Mr. **Perle**. We haven't. We did read what he said on the floor at the time.

Senator **Levin**. One last question.

SOVIET MILITARY POWER, 1984

The deployed Soviet system is referred to in the publication just issued entitled, "Soviet Military Power, 1984."

Are there limits to that system?

Mr. **Perle**. Yes, there are.

Senator **Levin**. Do you think it might have been useful to suggest that in that book?

Mr. **Perle**. I think on reflection after having heard your remarks earlier this morning, I think they would have benefited by saying it is not effective against all of our satellites.

Senator **Levin**. That is helpful.

I have no further questions.

I guess I will adjourn this part of the hearing. I think the chairman will agree to keep the record open.

Dr. **Cooper**. Senator, May I add a thought, as I did this morning, because I think it is important in discussing the reliability of the Soviet system. It is my understanding that the reliability estimates of the Soviet systems are not terribly different from the reliability projections for our own. I am concerned about painting a picture that the Soviet coorbital system is really just a clumsy system that has essentially no capability. I agree we should be balanced on both sides.

Senator **Levin**. Talking about comparison of two systems, does our system have greater capability than their systems if we are able to complete and deploy our system?

Dr. **Cooper**. I think it depends on what you mean by capability.

Senator **Levin**. What would you rather have, theirs or ours?

Dr. **Cooper**. Their antisatellite system has a higher range of altitude.

Senator **Levin**. Would you rather have theirs or ours, assuming ours is deployed?

Dr. **Cooper**. I think I would rather have ours.

Mr. **Perle**. I think I would as well, although I believe it is important to recognize the Soviets have something we don't have, which is the capability to launch a sizable number of satellites in wartime.

As you know, we depend heavily on satellites launched in peacetime that cannot be easily replaced if they are destroyed whereas the Soviets have demonstrated their capability during the Falklands to launch a great many satellites rather quickly, so that we have a much larger number of objects to be concerned about than they do.

Senator LEVIN. Weighing all these advantages and disadvantages, assuming we deploy our system, you would rather have ours?

Mr. PERLE. I would rather have ours than theirs.

On the other hand, as our program is somewhat encumbered at the moment by legislation, I would rather have one that flies than one in prospect.

Senator LEVIN. We will bring this portion of the hearing to a close.

Does the chairman want to go into executive session at this point?

STAFF. If the witnesses care to do that.

Senator LEVIN. I don't have any desire. If the Chair doesn't, it will be up to the witnesses.

Dr. COOPER. It is fine with me.

I would like to speak to you for a moment, if I could, on the side rather than go into executive session to point out the other concerns I have about high altitude bans.

Senator LEVIN. That can be submitted for the record if you want. We will leave this record open for 24 hours.

We will go into executive session to give you an opportunity to make clear your concerns.

[Whereupon, at 3:35 p.m., the subcommittee proceeded in executive session.]

EXECUTIVE SESSION

Senator WARNER. The subcommittee will now go into executive session.

Gentlemen, thank you for your patience.

As I understand, each of you has a contribution that can best be made in closed session.

Dr. COOPER. I thought that dealing with some of your questions—and some that were discussed in the open session—would be better dealt with in closed session.

HIGH ALTITUDE BAN

For example, we were discussing earlier the possibility of a high altitude ban. There are a couple of important factors that were pointed out by [deleted] in our closed session this morning that should be kept in mind.

Senator WARNER. High altitude being geosynchronous altitude?

Dr. COOPER. Yes. [Deleted.] At the same time, we have no plans to extend the development of our miniature [deleted] vehicle to high altitude.

Senator WARNER. Mr. Perle?

PARTIAL BAN

Mr. **Perle.** I don't have anything that couldn't have been addressed in open session except maybe to try to sharpen a little bit the point on this question of partial ban.

I do think, and I hope I have made it clear, that a partial ban, a ban that deals with the smallest pieces of problems, but leaves the problem largely unaffected and, therefore, does not solve the problem, is not a terribly productive use of our energy.

I realize that it is difficult to accept this proposition, but not all problems are amenable to arms control solutions. This may well be one that is not.

I think it is worth asking whether it demands too much of arms control to solve some problems that are inherently insolvable by arms control and can best be solved by other methods so that we can use our energy in the arms control area for those problems that do have potential for arms control.

If we attempt to do too much with arms control, we will compile a record of failures.

It seems to me unnecessary to do that. Not every problem is amenable to an arms control solution.

In the past administration, in particular, arms control solutions would pose a variety of problems including this one. They are just not terribly promising.

There was an effort made on arms control on the export of conventional weapons. At some sessions down in Mexico City that was discussed. That seemed to me at the time to be a nonstarter and it was the conclusion of the Carter administration as well that this was not a very promising avenue, although they started down that path and it only came after a few sessions to that conclusion.

Indian Ocean arms control, at the time when the Soviets had the advantages of land-based proximity and we were forced at sea in the Indian Ocean, arms control aimed at equality at sea, because it did not fit into a sensible geopolitical testament seemed to me an estimate balanced on failure.

My only pitch to you, Senator Levin, is that this may be an area where the prospects are so dim, where the potential is so insignificant alongside the problem that one seeks to solve that it might be better to face it squarely and honestly and not kid ourselves and say this is a good candidate for arms control, much as we may regret that there are other areas where we should concentrate our effort.

I would hope that we wouldn't be pushed in a position by this or any other administration, of being forced to go out and attempt to negotiate arms control which are unpromising just for the sake of doing something, having arms control.

We are having enough trouble at the moment getting the Soviets back to the table for some negotiations of a classical sort where there may be some potential for real agreement.

To take this one issue on top of it, with very little prospect of useful results, seems to me at best a waste of energy.

The administration does not want to close the door entirely because we will continue to pursue that. I would be less than candid if I didn't tell you it is not at present a promising avenue.

My own personal advice is that we have many other more important things to do than to chase the rainbow in this particular circumstance.

Senator **Warner**. When the interagency group met, I assume you shared that perspective?

Mr. **Perle**. I did, indeed.

Senator **Warner**. Yet we are carefully following each word—you use the word "may" there is enough equivocation in your statement with respect to others that there apparently are persons of comparable background and judgment to yourself that still hold open this option of negotiations.

Mr. **Perle**. That is really what I am expressing as a personal view. If I may make a further comment off the record.

[Off the record.]

Mr. **Perle**. We live in a climate in which the expectations of arms control are higher than reality in some circumstances.

No one wants to stand up and say that arms control in this or any other area is so unpromising that we ought not even begin.

Senator **Warner**. There must be some individual who has power to say it.

Mr. **Perle**. I am prepared to say and have said it. There is a great reluctance on the part of the administration to do that.

We live with a political world. We have allies. We have Members, important Members, of the Congress who feel otherwise.

So, I can understand why the interagency group and the President ultimately decided to leave the door open.

Senator **Levin**. You say this is a political decision. I thought it was based on merit.

Mr. **Perle**. It is a decision to keep the door open in the hope something would be found that would be useful.

Senator **Levin**. It seems that there is a real split here whether or not we want to continue to review the partial ban to see if it might be in the national interest.

It is clear some partial bans are verifiable. That is clear in the record.

The question is whether any partial bans might be in the national interest. It is clear that it isn't.

Dr. **Cooper**. Coming from a technical background as I do, I don't like to give conclusions until I finish the study. In this case, I think that there is still the possibility that on balance we may judge that some particular ban may be in our interest; or may be more in our interest than to continue with the status quo with no additional constraints beyond those provided by international law and existing agreements. It is also quite possible that I could end up pretty much in the same camp with Mr. Perle. I have not finished the study.

Senator **Warner**. The study addresses technical feasibility?

Dr. **Cooper**. The objective of the study is to arrive at a decision or judgment whether or not a particular prospective ban to be in our national interest. This is a study that is going on within the interagency process.

Senator **Warner**. In the technical assessment, will there be a policy consideration?

Dr. **Cooper**. Yes, sir. We are considering other kinds of agreements besides bans including possibilities analogous to the Incidents at Sea Agreement, an argument no doubt dear to your heart as its principal negotiator and signatory. We are also looking at confidence building measures which could complement such an agreement.

I really feel it to be a primary responsibility not to mislead the public into believing that they are getting something beyond the realm of the possible from space arms control agreements. At the same time, I think it may be possible to make the world a safer place through negotiations and agreements.

My mind is still open with respect to some space arms control possibilities. I would say that it is a narrow opening. I wouldn't want to mislead you. The difference between Richard and me is not as different as between night and day.

Mr. **Perle**. There is another element in this. That is, if at the end of the studies we do find something that we could propose that is just the beginning of the negotiations, we know what the Soviet position is, the Soviet position is stop the space shuttle for any military purpose.

Senator **Warner**. You mean the one we are operating now?

Mr. **Perle**. The one we are operating now.

Senator **Warner**. Stop it for any military purpose?

Mr. **Perle**. That is right. Do not use it for any military purpose.

One of the consequences of the negotiation, no matter how narrowly we attempt to define systems to be controlled, is going to be a mass of Soviet propaganda campaign against the United States space shuttle.

That carries some costs. Those costs have to be borne in mind and they are part of the commonsense decision as to whether there is enough potential to be gained in the negotiations to have started them in the first place.

That is one of the considerations that cause me to be very skeptical indeed of that potential. If you had a chance to solve the problem we are talking about, that would be a different thing.

I think everyone realizes we are not going to solve the problem of the Soviet capacity to attack our satellites.

The question becomes if you can find some narrow area that doesn't solve the problem and open negotiations around that narrow area, with everything else that entails, is it worth the cost of that negotiation given the probable results and probable benefits?

Senator **Levin**. What costs are there?

Mr. **Perle**. I gave you one. We will end up having multilateral forums, the Committee on Disarmament in Geneva, which is attended by a large number of neutrals and nonallied countries as well as a number of Soviet countries.

We will have a sustained propaganda attack on the U.S. space shuttle.

Senator **Levin**. I have the impression we won't negotiate on Asat.

Would we still believe, at least the administration still believe, there may be partial bans which are in the national interest?

I think we are giving fodder to their propaganda mill for nothing; the Soviets point to that, our European allies are upset, it is for nothing as long as the door is open.

I think we are just giving propaganda material.

Senator **Warner**. What would you suggest?

Senator **Levin**. Emphasize the postive parts. We are still looking for the possibility of the national interest aspect of partial bans. We are. It is right in the report, we are still looking.

Dr. Cooper assured us again today. There are other defenses to Asat. It is true it may not be a defense to the Soviet system. We may have to put in some defensive equipment on our satellites. [Deleted.]

It is very possible that low-energy lasers may be effective against satellites.

Mr. Perle is nodding his head yes. For us to give the impression which we have that we just aren't going to negotiate and I know the word "comprehensive" is in the report, but we are not going to negotiate a ban on Asat, I think is to accentuate the negative and plays in the Soviet hands.

Senator **Warner**. I continue to be of an open mind and I think you know me well enough to know of my sincerity in that observation, but what concerns me is the thought that we might be able to go and isolate one or two systems and put in a ban, but there are a dozen others that would be equally or more effective, the world will misperceive this and suddenly think we have an antisatellite thing and maybe lend credence to the sanctuary concept when all we have done is allow the Soviets to utilize the other systems.

ORBITAL INTERCEPTOR

Senator **Levin**. The answer is that there are other ways of handling some of those systems.

The orbital interceptor, I don't know whether or not the ban is verifiable in the national interest. But there are other ways to defend against it.

There are other ways to defend against them, you may be able to build in a new capability in the satellites so that they can maneuver away from that interceptor.

We should not exclude that possibility. There are very few comprehensive solutions to any of the problems of the world. For us to throw away the possibility of partial solutions and give that impression to the world when we are still looking at it and when it may be in our interest to do it and when there may be other solutions to the part we can solve through arms control such as defensive capability, we know there is defensive capability that can be built into the satellites.

That is a partial solution. You have to go down each one. I think for the record we ought to ask them on each one of the Asat contentions what is the defense?

Dr. **Cooper**. That is part of the report, sir.

Senator **Warner**. That you are working on?

Dr. **Cooper**. No, that was presented by the President.

Senator **Warner**. The unclassified version?

Dr. **Cooper**. The unclassified and classified reports.

Senator **Levin**. We are going to be asking for more detail.

Senator **Warner**. The purpose of our dialog is to try to assist me and others to make a decision.

Should we have a hearing here to look at and hear from others who might have a different perspective?

I anticipate a very full-blown debate of this publicly and in executive session in the Senate. I certainly want to provide a record which is hopefully adequate for other Members of the Senate to study.

Senator **Levin**. There has been a lot of testimony.

It is important that we go through these six or seven Asat programs that are possible in the Soviet Union.

Senator **Warner**. How many are there really?

Senator **Levin**. How many Asat possibilities are there?

Dr. **Cooper**. There is a co-orbital one, lasers, ECM, neutral particle beams, direct ascent missiles, and so forth.

Senator **Levin**. Just roughly 5, 10, or 15? Let us pick a figure of 10.

On two of those we can verify a ban and it would be in the national interest. Let us assume we can verify two and it would be in the national interest. Now, you have eight left.

What do you do with the ones left?

You may have to build a defensive capability in the satellites to maneuver away from them, to reflect an energy beam, to absorb.

I don't have all the technicalities, but there are defensive capabilities you can build if we appropriate the funds to defend against Asat.

How many of the eight left can we defend against?

We ought to do that very methodically.

Senator **Warner**. We may need another hearing.

Mr. **Perle**. What Senator Levin is talking about is the subject of the ongoing study. It is not clear to me how much we can add at this stage.

I have a question that arises out of Senator Levin's remarks. That is, Senator, are you saying that we ought to be content only with the combination of partial bans on some and defenses, or should we have some offensive capability of our own?

Senator **Levin**. I don't know. I can't answer that question.

Mr. **Perle**. My own view is that we need whatever else we have. If it can be obtained at reasonable cost, we ought to have an offensive capability that would constitute a very powerful deterrent to the Soviets who would know that we could respond in kind if they began to attack by any means our satellites.

Senator **Levin**. I don't exclude that and I wish you didn't exclude the partial bans. I am open to that. I am also open to putting in some money to build in defenses, maneuvering satellites, hardening, shielding satellites, maintaining orbital spares, sending up backup satellites.

I don't know all these things technically, but I am open to the offensive capability provided you stay open to the partial bans and putting some defensive capability on our satellites.

Mr. **Perle**. I would be much more comfortable when it comes to partial ban if it were combined with an offensive capability.

In the final analysis I think that deterrent capability will determine some behavior in wartime.

Senator LEVIN. I am glad that you are open to partial bans.

Mr. PERLE. Let us both remain open.

Senator WARNER. With the addition of an offensive capability.

Senator LEVIN. And I presume defensive capability.

Senator WARNER. And a mix of offensive and defensive capability.

Senator LEVIN. That is what negotiations are for basically.

Senator WARNER. I have a couple questions to be answered for the hearing record.

[Questions submitted by Senator Warner to be answered for the record follow:]

QUESTIONS SUBMITTED BY SENATOR JOHN W. WARNER

Senator WARNER. Dr. Cooper, will our F-15 Asat program have the capability to attack Soviet early-warning satellites, such that our program raises concerns about instability?

Dr. COOPER. The F-15 Asat program would not have such a capability. The United States has no plans to extend the altitude capability of the MV Asat system to place high-altitude satellites at risk. We are continuing to review possible improvements in U.S. Asat capabilities, including measures that would give the current system a somewhat higher altitude capability. However, this study activity does not indicate a commitment to develop a high-altitude Asat capability.

Senator WARNER. Dr. Cooper, what impact would arms control limitations on high-altitude Asat systems have on research associated with the Strategic Defense Initiative?

Dr. COOPER. The SDI research program would not be affected by limits on high-altitude Asat systems. If the SDI research eventually produces technically and economically feasible ballistic missile defense concepts, such systems would need to be examined with respect to the ABM treaty, our national security requirements, and any Asat agreements established in the interim years.

Senator WARNER. Mr. Perle, do we have a large number of important satellites that are within the range of the current operational Soviet Asat system?

Mr. PERLE. The operational Soviet Asat interceptor can reach targets orbiting at some orbital inclinations to about [deleted] kilometers. However, it probably is intended for high priority U.S. satellites that operates at lower altitudes. We consider the capability of this Soviet system to be threatening to [deleted] U.S. low-altitude satellites. A discussion of the specific U.S. satellites threatened can be found in Annex D of the March 31 Report to the Congress on ASAT Arms Control. (The classification of this information requires that it be stored by the Senate Select Committee on Intelligence.)

Senator WARNER. Mr. Perle will our F-15 Asat program have the capability to attack Soviet early-warning satellites, such that our program raises concerns about creating instability?

Mr. PERLE. Early warning satellites operate in a highly elliptical orbit to provide a large field of view. The U.S. Asat interceptor will not have the capability to attack satellites in such orbits. Potential targets for the U.S. Asat interceptors include [deleted] satellites designed to target or provide targeting information about Allied forces. These satellites operate at low altitudes and could not be easily made to operate at higher altitudes.

QUESTIONS SUBMITTED BY SENATOR CARL LEVIN TO MR. PERLE TO BE ANSWERED FOR THE HEARING RECORD

ASAT ARMS CONTROL

Senator LEVIN. The late Soviet leader, Yuri Andropov proposed a moratorium on Soviet Asat tests if the United States stopped plans for its tests. Has the new Soviet government renewed this offer?

Mr. PERLE. It should be noted that Andropov's moratorium offer of August 14, 1983, was not made formally in the Soviet draft treaty or in any other diplomatic channel. The moratorium on Asat systems offered by Andropov was reiterated, but not through formal channels. General Secretary Chernenko made a direct reference to the Asat moratorium on May 20, 1984, in his response to the letter by two American scientists. In his June 11 interview with Joseph Kingsbury-Smith he also stated that Moscow is in favor of entering talks on banning the use of Asat weapons. In the Soviet offer of June 29 to begin talks in Vienna on Asat arms control, the testing moratorium was reiterated.

Since the USSR has the world's only operational Asat system, which it has maintained and has tested more than a dozen times since the 1960s, a moratorium would effectively put the United States in the position of accepting for the indefinite future a proven Soviet Asat capability while the United States would be prevented from developing and testing a system of its own. However, as the President emphasized in his speech to the UNGA, in agreeing to the Soviet offer for Asat talks the United States stated it was prepared to consider measures of mutual restraint while negotiations proceed.

Senator LEVIN. Has the United States formally responded to this offer; when, how and what has the U.S. done to get the Soviets to discuss Asat limits?

Secretary PERLE. Since Andropov's moratorium proposal was not offered in formal channels, the United States did not respond formally to the Soviets but has made known its view concerning the moratorium in numerous public statements. The United States did respond positively to the Soviet offer of June 29 for bilateral space arms control talks. As the President reiterated in his UNGA speech, the United States has made it clear that it is prepared to discuss what measures of mutual restraint might be appropriate during those negotiations. However, we could not accept a moratorium as a precondition for such talks since this would preserve a Soviet monopoly on Asat systems and could reduce the Soviet incentive to participate in serious discussions on effective Asat limitations.

The United States has intensively studied space arms control, in search of selected limits on specific types of space systems or activities in space which could satisfactorily deal with the many problems outlined in the President's March 31 Report to the Congress. The United States has proposed and remains ready to meet with the Soviet Union to examine the problems and potential of space arms control.

Senator LEVIN. If the Soviet proposal is unacceptable, why doesn't the United States propose an alternative? Are you saying that we really do not want to negotiate?

Secretary PERLE. As we have said in the past, the United States supports responsible efforts to control arms in outer space. However, we would point out there are problems to be overcome, including, existing Soviet Asat capabilities, monitoring difficulties, our concerns about Soviet targeting satellites and the fact that Asat capabilities are inherent in systems designed for other purposes.

The United States has completed a study of various proposed limitations on Asat weapons with a view to negotiations and on June 29 informed the Government of the Soviet Union that it was prepared to meet with the Soviet Union for the following purposes: (1) to discuss and define mutually agreeable arrangements under which negotiations on the reduction of strategic and intermediate-range nuclear weapons, can be resumed, and (2) to discuss and seek agreement on feasible negotiating approaches which could lead to verifiable and effective limitations on anti-satellite weapons. We will also be prepared to discuss any other arms control concerns or other matters of interest to both sides. We are also prepared to consider measures of mutual restraint while negotiations proceed. In short, the U.S. stands ready to work out agreements concerning outer space and have told the Soviets that we are prepared to meet any time and any place to do so.

Senator LEVIN. In ruling out a comprehensive Asat agreement, the administration did say it would consider more limited bans. What might those be, and why shouldn't we begin negotiations on more limited bans, even if a comprehensive ban is ruled out? How can we argue against beginning talks when we say we will consider more limited Asat bans? Shouldn't we begin that process and try to make some progress? Isn't some increased security for our satellites better than no increase at all?

Secretary PERLE. The United States continues to study space arms control to determine if selected limits on specific types of space systems or activities in space can be found that would be in our national interest. When the Soviet Union offered to begin negotiations on space arms control in Vienna in September, the United States was willing to meet with the Soviets and relayed that willingness to the Soviet Government. The Soviets, however, backed away from their original offer and refused to meet with us. We remain ready to discuss a wide range of issues of concern to both sides.

Senator LEVIN. Since many of our most important satellites are in orbits higher than the operational limits of present Soviet Asats, wouldn't it be in our security interests to negotiate a ban on development of more capable Soviet Asats?

Mr. PERLE. The United States continues to study such approaches as bans on high-altitude systems to determine if such limitations are in our national security interest. Difficulties with such approaches include problems of verification and the definition of high-altitude systems.

Senator LEVIN. If the "genie" is out of the bottle on banning low orbit Asats, why shouldn't we try to negotiate a ban on high-orbit Asats, verified through test monitoring, which would protect our most valuable satellite assets? Isn't that in our interest?

Mr. PERLE. A ban on high altitude Asat systems is one of several types of limitations that are under consideration. Whether this type of ban is in our national security interest and whether the technical problems it presents can be overcome, must be carefully analyzed before we can determine if this is a viable option for negotiation.

Senator LEVIN. What kind of high orbit Asats are the Soviets developing, and have these programs advanced beyond the point where their interruption by a negotiated ban would deny the Soviets this capability, even if not presently deployed? Have the Soviets tested these capabilities enough times to be confident they would work?

Mr. PERLE. Current Soviet Asat capabilities include an operational orbital interceptor system, ground-based test lasers with probable Asat capabilities, and possibly, the GALOSH ABM interceptors, and the technological capability to conduct electronic warfare against space systems.

A Soviet high-altitude orbital interceptor capability is a possible threat, but we have no direct evidence of such a program by the Soviets, and we may not obtain such evidence before testing. Other techniques for accomplishing this objective may appear preferable to the Soviets. For example, they could also use their developing electronic warfare capabilities against high-altitude satellites. We cannot say which, if any, such high-altitude capabilities may be developed by the USSR.

Continuing, or possible future, Soviet efforts that could produce Asat systems include developments in directed energy weapons. We have indications that the Soviets are continuing development of ground-based lasers for Asat applications. There is a possibility that some sensors on some U.S. satellites could be damaged by ground-based Soviet lasers. In addition, we believe the Soviets are conducting research and development in the area of space-based laser Asat systems. We have, as yet, no evidence of Soviet programs to develop Asat weapons based on particle beam technology.

Capabilities which have been or could be surreptitiously developed possibly threaten all U.S. satellites up to geosynchronous orbits. The Soviets have a large and active research and development program in space-related systems. We do not know how much testing associated with these space systems is directed toward developing Asat capabilities.

Senator LEVIN. The administration contends we need an Asat to threaten these Soviet satellites by which they might be able to target our naval forces. Yet testimony indicates that various parts of the Defense Department disagree on the value of threatening these satellites. Has this disagreement been resolved?

Mr. PERLE. Increasingly, the USSR is using space-based assets to improve their offensive military capability. Additionally, we are growing more dependent on space-base resources for part of our defensive capability. All services agree that to deter attacks against our satellite systems and to prevent the use of Soviet satellites in support of offensive operations, we need to develop an Asat capability. There have been some differing views over the level of support for the system, as is the case for many programs where there is competition over limited resources. However, the differences have been resolved and department-wide support is indicated by the DOD 1986 budget. Much of the alleged indications of non-support for the U.S. Asat system may have been a result of statements in testimony being taken out of context.

Senator LEVIN. Secretary Perle, had DOD done an exhaustive analysis of the costs and schedules to implement these other measures compared with the costs/schedule for the low-orbit Asat we are developing? If not, how can it contend these are not acceptable alternatives? If so, provide that analysis for the record.

Mr. PERLE. Defensive measures for satellites can improve their survivability, however, these measures are expensive, reduce useful payload weight, can shorten satellite mission life time, and add to system development and testing complexity thus lengthening development cycles.

In addition, defense measures cannot be considered as an alternative to an Asat capability. No single defensive measure is totally effective against all threats. An Asat capability for the United States would help deter Soviet use of their Asat interceptors. Our Asat capability would also provide the capability, within such limits imposed by international law, to deny any adversary the use of space-based systems that provide support to hostile military forces.

Senator LEVIN. The President's Science Advisor, Dr. George Keyworth reportedly has said it would not be difficult for the United States to deploy satellites with defensive devices that jam the electronics of Soviet Asats. Do you agree, and if that is so, why isn't that preferable to developing an Asat of our own?

Mr. PERLE. The current Soviet Asat capabilities include an operational orbital interceptor system, ground-based test lasers with probable Asat capabilities, and possibly, the nuclear-armed GALOSH ABM interceptors, and the technological capability to conduct electronic warfare against space systems. Only some of these would be susceptable to the kinds of devices mentioned by Dr. Keyworth. Over the past several years the United States has begun to incorporate survivability features into various satellite systems. Enhancing space system survivability requires a variety of measures. However, these defensive measures add to satellite costs, reduce useful payload weights, shorten mission life time, and add to system development and testing complexity. Finally, no single defensive measure is totally effective against all threats. Therefore, while the United States is developing defensive measures, they cannot guarantee protection for U.S. satellites.

A U.S. Asat would provide a deterrent to the Soviet use of any of its Asat capabilities by giving the United States the capability to respond in kind to a Soviet Asat attack. Its utility would go beyond that. It would give the United States the capability, within such limits imposed by international law, to deny any adversary the use of space-based systems that provide support to hostile military forces.

Senator LEVIN. The Republican-dominated Senate Foreign Relations Committee has urged that a temporary moratorium on U.S. Asat tests be undertaken to give the United States time to open negotiations for Asat limits with the Soviets and test their willingness to agree to such limits. A lack of such willingness could be greeted by resumption of testing. What are the problems with this approach, since as the committee says in a recent report:

"We have lived with the Soviet Asat for 15 years. A further delay of limited duration in testing the F-15 based system seems justified if it can lead to averting an open-ended space arms race?"

Mr. PERLE. For a number of years, a destabilizing and inequitable Soviet monoply in Asat systems has existed. In the late 1970s, we determined that the United States needed an Asat capability to help deter use of the Soviet Asat and to counter a growing threat posed by present and projected Soviet space systems. We began development of our own Asat system at that time and that development process is now underway.

We believe the Soviet awareness of the U.S. Asat test program has been a prime motivation for the Soviet proposal for negotiations on what they called space weapons, including ASAT systems. The United States acceptance of this Soviet invitation was without preconditions, and we regret that these proposed talks did not take place. The United States nevertheless remains willing to discuss limitations on Asat capabilities as one of a number of vital arms control concerns, including most importantly, offensive strategic weapons.

Programs in the research and development phase pay a much higher price for a test moratorium than do operational systems. Even a short delay in the test program would delay the time that the U.S. Asat system could be operational. This would decrease the Soviet incentive to negotiate in good faith.

Senator LEVIN. Wouldn't Soviet willingness to negotiate/agree to the more intrusive verfication procedures which may be required for verifying Asat treaty compliance be a test of their seriousness to eliminate current Asats and ban new ones, as claimed by Mr. Andropov?

Mr. PERLE. Verification and other technical problems extend beyond the reluctance of the Soviet Union to cooperate. For example, even if we were able to achieve an agreement to ban Asat systems, and a way were found to verify elimination of the operational Soviet Asat system, other problems would remain to be solved. The USSR could retain the capability to redeploy quickly a system in which they would have confidence. If prior to the ban the United States had not tested its MV Asat system, the Soviets alone would possess such proven technology. It might take the Soviets a year or less to deploy their Asat system again. In addition, the Soviets could have additional Asat capability in equipment amenable to undetected or surreptitious development, which could be brought to operational status, or to a status that would permit rapid "breakout" from the agreed ban. Moreover, the Soviets possess other systems which could be modified to provide an Asat capability, such as ABM interceptor missiles, ballistic missiles with modified guidance logic and space boosters carrying nuclear payloads.

While verification presents difficult problems for Asat arms control, the administration has not ruled out Asat talks on verification grounds and remains willing to discuss these problems with the Soviets.

Senator LEVIN. The administration contends that even cheating in very small numbers of Asat weapons would be highly dangerous because we have so few satellites of great importance. Thus verification becomes a critically difficult standard, it contends. If we proliferated the number of important satellites we have--early warning, reconnaissance—and developed a rapid relaunch capability, wouldn't this undercut greatly the risk from minor Soviet cheating? Wouldn't this make the verification problem more manageable? Have we studied how proliferating these satellites plus relaunch capabilities might complement arms control efforts and make such an Asat treaty more achievable? If not, shouldn't Congress have that type of information? Shouldn't the administration, before it rules out Asat talks on verification grounds?

Mr. PERLE. The administration has not ruled out Asat negotiations on verification grounds. On the contrary, we accepted the Soviet proposal for talks in Vienna. We have, however, noted in our March 31 Report to the Congress the technical problems associated with Asat arms control, including verification.

In addition to being prepared to meet with the Soviets to discuss these issues, we are examining options to enhance satellite survivability and endurance. One such option is the possibility of increasing the number of replacement satellites. Two considerations are important to bear in mind: (1) Soviet abilities to mount attacks, especially using residual capabilities in systems not originally designed for Asat use; and (2) the affordability of sufficiently greater numbers of satellites, rapid replenishment assets and launch capability to alter appreciably our present vulnerabilities to a Soviet Asat attack.

The current operational Soviet Asat inceceptor is launched from Tyuratam where two launch pads and storage space for additional interceptors and launch vehicles are available and are shared with other Soviet space systems. Several interceptors could be launched each day from each of the pads. Other Soviet Asat capabilities, possibly using directed energy weapons, could produce an even more rapid Asat capability. Thus, while we should do all we can afford to do to improve survivability and endurance of U.S. satellites, it appears that we will continue to find it extremely expensive and operationally problematic to attempt, in effect, to defeat Soviet abilities to attack our satellites by proliferating such satellites.

Rather than establish a situation whereby Soviet cheating could be tolerated, it would seem more prudent to establish arms control provisions that are effectively verifiable and to proceed with the development of a U.S. Asat capability which would serve as an effective deterrent to the Soviets ever using their Asat systems.

Senator LEVIN. Has DOD compared the cost of this to the $3.9 billion for the low orbit Asat?

Mr. PERLE. The cost of providing an adequate number of backup satellites in orbit, stockpiled replacement satellites and launch boosters and possible additional launch facilities could be very high. The worth of a U.S. Asat program should not be evaluated simply by a cost comparison with an alternative that would attempt to overwhelm the Soviet Asat interceptors with additional targets. The ability to respond in kind would provide the United States with a deterrent to the Soviet Union using its Asat capability, which could help assure continuous operation of important U.S. satellites in times of crisis. Disruption of satellite operations during a crisis could lead to a conflict and could affect its outcome. Crisis stability would be much better served by a situation that deters the start of conflict, rather than one that replaces targets after a conflict starts.

An Asat system also provides the United States with the capability, within such limits imposed by international law, to deny any adversary the use of targeting satellites that provide support to hostile military forces.

Senator LEVIN. You imply that in a conventional war, regardless of whether the Soviets attack our satellites, we might attack theirs to negate their naval targeting threat. That then could prompt them to attack our satellites. Does the JCS agree that the military value of attacking the Soviet targeting satellites outweighs the military loss from their attacks on our satellites?

Aren't our low level satellites more important to us than theirs are to them? Unless we use other methods to increase survivability of our satellites, haven't we increased the threat to our own security from developing a low orbit Asat?

Mr. Perle. Both countries are becoming increasingly dependent on the support provided by satellite systems to employ effectively military power through all levels of conflict. All elements of the DOD agree that it is important to have the capability to negate Soviet targeting satellites if a conflict should occur. Soviet targeting satellites can be used to direct weapons and therefore their existence during a period of conflict directly threatens United States and Allied lives and warfighting material. U.S. low-altitude satellites do not have the capability to threaten directly Soviet forces in a manner similar to certain Soviet targeting satellites and thus, attacks against such U.S. satellites would represent an escalation over attacks against Soviet targeting satellites only. The Soviets may not wish to initiate such an escalation.

The deployment of an Asat capability by the United States will provide a deterrent against Soviet attacks on our satellites and thereby increase the security of our satellites. In addition, the United States is designing improvements to increase the survivability of its satellites for the future should this deterrence fail.

Senator Levin. Mr. Secretary, the administration contends that if we spend enough money on R&D on the Strategic Defense Initiative, we can possibly overcome the incredible technical challenges inherent in developing such a ballistic missile defense.

Isn't the same American genius which can do this available to develop better Asat verification capabilities as well as other space weapons treaties? Shouldn't we apply this genius to the latter task while we are undertaking negotiations?

If we can do SDI, as Secretary Weinberger is optimistic we can, why can't we develop the ability to verify Asat?

Mr. Perle. Certain difficulties of verification, especially verification of an Asat agreement, go beyond mere technical challenges. In general, verification of arms control agreements suffers from the extremely asymmetric degree of openness between the United States and the Soviet Union. This problem is aggravated for Asat systems because the satellites which serve United States and Allied security are few in number. Cheating on Asat limitations, even on a small scale, could pose a disproportionate risk to the United States. The wide variety of Asat systems (as addressed in the President's March 31 Report to Congress on U.S. Asat Arms Control Policy) and the fact that Asat capabilities can be a byproduct of systems developed for other missions, create problems of identifying what would be prohibited under testing limitations regardless of the quality of U.S. technology. Finally, while the difficult verification problems associated with Asat arms control might be decreased with the establishment of cooperative measures, in some instances these measures could create an unacceptable risk of compromising the protection of sensitive information regarding certain U.S. national technical means. We are actively working to solve these difficult verification problems of Asat arms control.

Senator Levin. Present Soviet ICBM mounted Asats have a unique signature because of the launch vehicle. That gives us warning of a potential attack for about 90 minutes. In this case, why isn't a maneuver capability sufficient to defeat this Asat?

Mr. Perle. Satellite maneuvering could possibly be used as a countermeasure to the existing Soviet Asat system if adequate warning were available, and if the satellite command capability could support such a rapid response. We are considering the addition of some defensive capabilities to our satellites. However, to add a defensive maneuver capability to a satellite would reduce its operational payload and could shorten its mission lifetime, and because of limits to the amount of propellant that could be carried by the satellite, the number and duration of maneuvers would be limited. Furthermore, since the Soviet Asat interceptor is launched by a booster that is also used to launch other satellites, quick reaction maneuvers could be stimulated by such launches on false alarms, thus quickly depleting propellant reserved for maneuvers. Moreover, other Asat techniques are available to the Soviets against which primitive envasive maneuvering techniques would be largely, if not wholly, ineffectual.

Senator Levin. It is my understanding that the Soviets would not be able to adapt their current system to attack maneuvering satellites or to use that existing satellite to go after higher altitude (synchronous or 5,000 mile high) satellites without much more testing. Wouldn't a test ban remove this Asat threat from maneuvering low orbit satellites or high altitude assets?

Mr. Perle. Since the Soviet Asat Interceptor has been tested over many years and is now considered operational, a test ban would not remove this existing threat to our low-altitude satellites. A test ban of very long duration would tend to reduce the confidence the Soviets would have in their operational system. However, a test ban would not necessarily cause the Soviet system to atrophy, since after a hiatus of several years in Asat testing, the Soviets were able to resume testing without any apparent degradation in its performance.

The current Soviet Asat interceptor does not have any capability against high-altitude satellites. While a high-altitude orbital interceptor is a possible threat, we have no direct evidence of such a program by the Soviets. Other techniques for providing a threat to high-altitude satellites may appear preferable to the Soviets. The problems regarding verification and effectiveness of a ban on these other high-altitude-capable systems are under study.

Senator LEVIN. Ground-based lasers of high enough power to destroy satellites are thought unlikely because the phenomenon of thermal blooming (heat/light dispersion) in the atmosphere prevents high laser power from being transmitted accurately. Doesn't this minimize the ground laser Asat threat?

Mr. PERLE. While it is true that the phenomenon of thermal blooming can reduce the power that a ground-based laser can transmit to a satellite in orbit, this phenomenon does not negate the potential threat to the survival or operation of U.S. satellites posed by Soviet laser development programs. The phenomenon can be mitigated by the use of a pulsed laser. In addition, there is a possibility that some sensors on some U.S. satellites could be damaged by ground-based Soviet lasers.

Senator LEVIN. The administration's Asat report contends that: "No arrangements or agreements beyond those already governing military activities in outer space have been found to date that are judged to be in the overall interest of the United States or its Allies."

Our allies are nervous enough about our space warfare programs, especially SDI. They are concerned that the rejection of even opening Asat talks is another piece of evidence this administration is not interested in arms control.

Considering these Allied sensitivities, did the administration get agreement from the Allies on its conclusion stated above before it made such a claim? This claim is critical to rejection of further negotiations. If we did not get Allied agreement, how can we possibly make this claim and try to speak for them in this area?

Mr. PERLE. The preparation and finding of the Report to the Congress on Asat Arms Control were not coordinated directly with our Allies. However, prior to and during the months of its preparation, consultations on the issue of space arms control were held with our allies.

Further, the report did not object to opening Asat talks with the Soviets. On the contrary, it concluded that the possibility still exists and that the difficult problems cited in the report are under study. We would note that our Allies have welcomed the U.S. acceptance of the Soviet offer to begin talks on space arms control and that they, like us, have expressed disappointment that the Soviets have now refused to meet with us.

Senator LEVIN. The administration report says it remains willing to examine space arms control issues in the multilateral Conference on Disarmament, yet it will not engage in formal international space weapons talks. Multilateral fora like the Conference on Disarmament are even more problematic in which to make arms control progress than bilateral talks with the Soviets, which are difficult enough. Why not avoid this additional complexity by getting on with negotiations with the Soviets?

Why won't "practical solutions" to the problems of developing a verifiable space arms control regime be less difficult to develop in bilateral talks with the Soviets instead of in a multilateral fora with many more nations?

Mr. PERLE. The Report to the Congress on Asat Arms Control does not say that the United States is *unwilling* to negotiate with the Soviet Union on space arms control. The report states, "The United States has been studying a range of possible options for space arms control with a view to possible negotiations with the Soviet Union and other nations, if such negotiations would serve U.S. interests". Indeed, the President has affirmed our willingness to open U.S.-Soviet talks in Vienna as proposed by the Soviets. We would be prepared to discuss a wide range of issues of concern to both sides.

Senator LEVIN. For each type of Asat listed on p. 11 in the administration's report, provide for the record the Intelligence Community's estimate of the confidence it has that limits on each type could be verified ("low, medium, high, etc.").

Provide for each the cost and schedule required to develop U.S. countermeasures, as also listed in the report in the p. 11 chart.

Mr. PERLE. Under current Soviet test practices, our confidence in monitoring tests of the current or a new version of the non-nuclear orbital interceptor against a low altitude target is [deleted]. If test practices were revised, our confidence would be somewhat less, and could be extremely scenario dependent, resulting in [deleted] confidence. If the Soviets were to cheat on a test ban, taking extreme measures to deny information or to disguise a test, the resulting confidence would be [deleted].

If the Soviets were to develop a direct ascent, non-nuclear interceptor similar to the U.S. MV interceptor, we would have [deleted] confidence in monitoring tests of such a system. Under revised test practices, we would have [deleted] confidence in monitoring such tests. If the Soviets were to cheat on an agreement prohibiting testing this type of interceptor, we would have [deleted] confidence in monitoring testing.

If the Soviets were to modify any of their ABM interceptors to provide a direct ascent non-nuclear Asat interceptor, we would have [deleted] confidence in monitoring such tests if current test practices were used. If revised test practices were used, we would have [deleted] confidence and if the Soviets were to cheat on a test ban, [deleted] confidence in determining that these tests were for Asat purposes rather than permissable ABM related activities.

If the Soviets were to use either ABM interceptors or ballistic missiles with nuclear warheads as Asat interceptors, we would have [deleted] confidence in assessing that any such tests were for Asat purposes, unless a target satellite of some kind were used. If point-in-space tests were used, we would have [deleted] confidence in monitoring such tests. If revised test practices were used or the Soviets cheat, we would have [deleted] confidence.

The Intelligence Community has not conducted an assessment of its ability to monitor the other types of Asat systems listed on page 11 of the Asat Report to the Congress.

The table on page 11 illustrates the types of Asat systems that have been developed, are under development or might possibly be developed. The protective measures listed represent generic techniques that could be developed for protection of satellites against these different types of Asat systems. Since there are no indications that the Soviets are developing all of the listed Asat capabilities, a detailed cost and schedule analysis for developing these generic protective measures has not been made.

[Whereupon, the subcommittee adjourned at 4 p.m.]

DEPARTMENT OF DEFENSE AUTHORIZATION FOR APPROPRIATIONS FOR FISCAL YEAR 1985

THURSDAY, APRIL 26, 1984

U.S. Senate,
Subcommittee on Strategic and
Theater Nuclear Forces,
Committee on Armed Services,
Washington, DC.

CHEMICAL WARFARE

The subcommittee met in open session, pursuant to notice, at 10 a.m., in room SR-232A, Russell Senate Office Building, Senator Dan Quayle presiding.

Present: Senators Goldwater, Warner, Quayle, Nunn, Exon, and Levin.

Staff present: Arnold L. Punaro, staff director for the minority; Robert F. Bott, William E. Hoehn, Jr., and George K. Johnson, professional staff members; Douglas R. Graham, research assistant; and Karen A. Love, staff assistant.

Also present: Gerald J. Smith, assistant to Senator Goldwater; Bernard R. Toon, assistant to Senator Quayle; and Jeffrey B. Subko, assistant to Senator Exon.

OPENING STATEMENT BY SENATOR DAN QUAYLE, PRESIDING

Senator Quayle [presiding]. The subcommittee will come to order in the absence of Chairman Warner, who will be here later on.

The subcommittee convenes this morning to receive testimony on the U.S. binary chemical modernization program in review of S. 2414, the fiscal year 1985 Defense authorization bill.

This has always been a controversial issue, and in connection with the tabling of a draft treaty by Vice President Bush in Geneva this month, it will receive considerable attention again this year.

In this morning's hearing we intend to develop the record upon which the subcommittee bases its recommendations for this important program.

The subcommittee is pleased to welcome our panel of witnesses this morning. This panel consists of Dr. Richard Wagner, the Assistant to the Secretary of Defense for Atomic Energy; Dr. Ted Gold, the Deputy Assistant to the Secretary of Defense for Chemical Matters; Gen. Frederick Kroesen, U.S. Army (retired), the former Commander-in-Chief of the U.S. European Command; David Emery, the Deputy Director of the Arms Control and Disarmament

Agency; and Maj. Gen. William E. Klein, Vice Director of Plans and Policy Directorate, Organization of the Joint Chiefs of Staff.

Senator Goldwater, do you have an opening statement?

Senator GOLDWATER. No statement.

Senator QUAYLE. Dr. Wagner, I invite you to go ahead and introduce your witnesses.

STATEMENT OF HON. RICHARD L. WAGNER, ASSISTANT TO THE SECRETARY OF DEFENSE (ATOMIC ENERGY)

Dr. WAGNER. Thank you, Mr. Chairman.

In addition to the witnesses here at the table which you have introduced, I would like to also mention the presence of a few other backup witnesses, Ms. Amoretta M. Hoeber, who is the Principal Deputy Assistant Secretary of the Army for Research, Development and Acquisition. She has been a guiding spirit behind the chemical warfare program in DOD.

Brig. Gen. Sidney Davis who is the Director of Nuclear and Chemical Warfare, U.S. Army; Rear Adm. Joseph J. Barth, Director of Strike and Amphibious Warfare, U.S. Navy; and Brig. Gen. Alexander K. Davidson, Deputy Director of Operations, U.S. Air Force; Col. Joe O'Brien, Head of Ground Combat Requirements for the Marine Corps; and Mr. Dominic Gasbarri, Intelligence Analyst for the Defense Intelligence Agency, an expert for chemical warfare matters.

My understanding is, and it is our desire, that you wish to keep as much of this hearing unclassified and in open session as possible.

However, for what General Kroesen has to say, which is the results of a study which he has chaired over several months, looking at what the real impact of the use of chemical weapons on the battlefield would be; there are some sensitive matters and we would prefer to go to closed session at that time.

I think that might be 45 minutes to an hour. Then, of course, if your desire is to hear current intelligence on this matter, in particular intelligence related not so much to Soviet capability, which I think has been well developed in the past, but on proliferation of chemical weapons, which we are all concerned about, we would want to present that in closed session as well.

Senator QUAYLE. Why don't we proceed as follows. You go ahead, followed by the rest of the witnesses, and discuss matters that you feel comfortable talking about in open session.

We will then ask whatever questions we may have.

Then we will go into closed session for whatever General Kroesen wants to say and the intelligence matters that you think the subcommittee ought to hear.

Before you do, I would like to reiterate what you said. We would like to get as much out to the public as possible. I know there is a reason for secrecy and confidentiality, but a lot of information becomes public anyway.

Dr. WAGNER. The administration's position is that it is in the national interest to completely eliminate chemical weapons by a comprehensive and adequately verified treaty.

Until that can be done, we must modernize our retaliatory capability so as to be able to deter the use of chemical weapons which is an approach that history shows to be effective.

DOD has worked closely for the last few years with the Arms Control and Disarmament Agency to ensure that our approach to this modernization, which we believe must start now, is carefully tailored to complement our approach to a treaty eliminating chemical weapons and vice versa.

This morning we will illuminate for you how these two elements of our posture link together in some detail because I think it is important to understand the complementary nature of the modernization and the arms control components.

We realize any movement toward modernization of our retaliatory capability is controversial. We believe despite that controversy, we have in the past few years made good progress in building a base of understanding the facts in this matter, the central fact being that we simply do not have an adequate deterrent capability today.

We think that with that base of understanding and with the complementary nature between the arms control and modernization program that our position is a sound one and one which the Congress can support.

I would like to start off this morning by asking Dr. Ted Gold, who in the Department of Defense has pulled together this program and the basis of understanding behind it, to say a few words about our modernization program and then we will turn, if we can, to Mr. Emery for the arms control presentation.

Senator QUAYLE. Dr. Gold?

STATEMENT OF DR. THEODORE S. GOLD, DEPUTY ASSISTANT TO THE SECRETARY OF DEFENSE (CHEMICAL MATTERS)

Dr. GOLD. I have a statement which I am submitting for the record and will not read.

As Richard mentioned, the Department of Defense has two basic responsibilities in this Nation's effort to eliminate the threat of chemical warfare.

One is to support the attempts to achieve a complete and verifiable ban. We have been very active on that front for the last several years and I would be delighted perhaps later to add to David Emery's description of the arms control activities, particularly highlighting the role that the Department of Defense played in those.

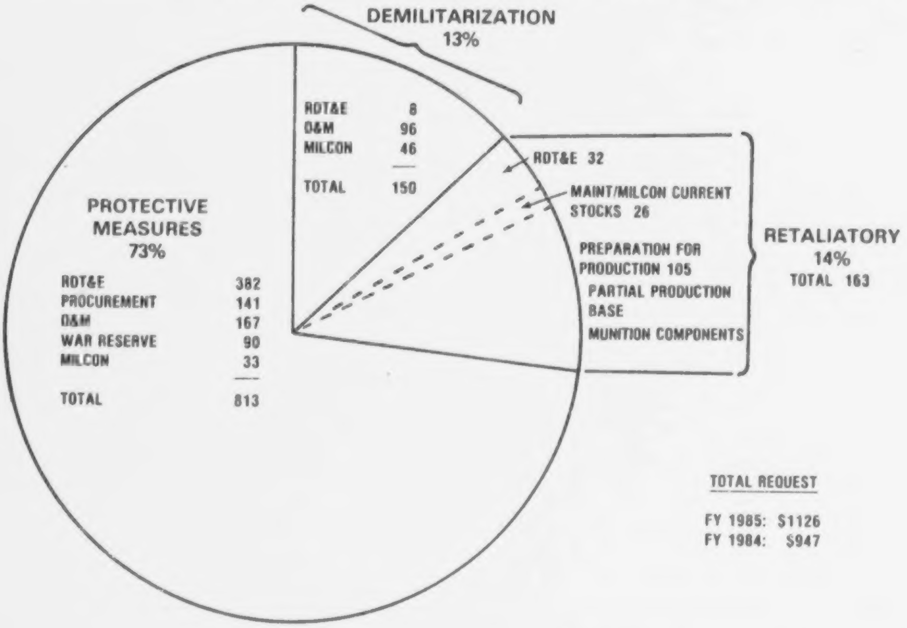
Our other responsibility is to restore and maintain a deterrence against chemical warfare until we can achieve a comprehensive ban that can effectively eliminate the threat.

The essence of the deterrent approach, the strategy for deterrence is to have the capability to deny the Soviet Union, or anybody else that initiates chemical warfare, a significant advantage from initiation of such warfare.

Unfortunately, I am not able to say that we have that effective deterrent now, largely due to our inability to modernize one critical element—a credible retaliatory capability.

I would like to review our budget request for fiscal 1985 highlighting the complementary elements.

FY 1985
CHEMICAL WARFARE DETERRENCE PROGRAM ($M)



The total budget request is for somewhat over $1.1 billion. That is up approximately 17 percent from last years request.

This year we continue to put most of our money and resources into improving the protective aspect of our posture. That is the suits, the collective protection, the detection, warning, and monitoring equipment, decontamination and medical.

All these elements are required to provide our forces with the capability to survive chemical attack and at least have some opportunity, some ability, to carry out their mission in wartime.

So, we have approximately $800 million in the protective part of the program, almost 75 percent of our total program, to deter chemical warfare. As it has been in the last several years, it is approximately equally divided between research and development in our quest to develop better equipment and the procurement of needed defensive equipment.

This year, in fiscal 1985, we will be procuring masks and suits for all the services.

We will be procuring a British manufactured device, a chemical agent monitor which I and many other people are particularly excited about. It will give us a much improved capability to monitor the presence and level of chemical agents on the battlefield.

We also will be improving collective protection for all services: Beginning in fiscal year 1985 our first hybrid collective protection system which includes positive overpressure filtration will be in the M1-E1 tank. It has taken a long time to get overpressure systems into our fighting vehicles. So, we are continuing to put the bulk of our resources into the protective aspect. That is a necessary part of restoring our deterrent.

However, it is not a sufficient part by itself. The reason is that one-sided use of chemical weapons, even against a well-protected force, can be devastating on the battlefield.

The protective gear which is intended to save the soldiers, airmen, and seamen's lives also prevent them from performing their tasks with anywhere near the effectiveness needed.

Part of that problem is caused by the debilitating nature of the protective gear, itself: The thick gloves, the heavy suits, the masks, all designed to keep this very lethal environment from the person.

While it does keep that lethal environment from the person, it also causes dramatic buildup of heat stress so that if you have any kind of physical labor to do, you cannot do it for very long.

It imposes severe limits on mobility, dexterity, tactility; any task that requires a great deal of dexterity such as in high performance aircraft with their great variety of multifunction buttons or repairing radios, are difficult if not impossible, to do when you have the protective mask and hood and are wearing these 20 mil thick rubber gloves.

However, the problems of operating in a chemical environment go far beyond just the loss of performance that the individual faces in trying to operate in this gear.

Units are burdened with greatly increased tasks when chemical weapons are used against them. The task of locating uncontaminated areas takes time and resources.

You have to go through the problem of getting out of your contaminated equipment and suit. Again, the process of decontaminating people, suits and equipment is labor-intensive and time-consuming on the battlefield. Time spent in that is time not spent in firing guns and bringing up supplies and all the other tasks which are needed to maintain a modern military force.

Also there is the extra burden of resupplying protective equipment. It is not only the suits for which you have to keep up a constant flow to the front, but additional supplies. For example, people doing hard work in protective gear can drink four times as much water as without protective gear. You have to ensure a supply of this water.

So, you have the problem faced by the individual in the suits and you have the problems faced by the units that are caused by having to operate in a contaminated environment and finding uncontaminated areas and decontaminating.

Then there are problems which we are in the process of relearning through increased exercises and studies like the one that General Kroesen will tell about—that is the command problem.

It is not only the panic that you can expect when people are exposed to this brand new lethal environment where a single drop on the skin can kill you, when it is something they have never experienced or come close to experiencing before. We are relearning the difficulties in providing effective command particularly at the time we need it most, i.e., when troops are exposed to this new lethal environment. These problems are caused by the protective gear, the loss of communication and the sense of isolation engendered.

Studies show that men perform brave tasks on the battlefield to a large extent because of their concern about their peers, what their peers think and they are motivated by a sense of comradery in dangerous times. Wearing protective gear makes it very difficult for those activities to come into play. The type of eye-to-eye contact that we have now, which perhaps adds credibility to my testimony is far more important on the battlefield when a platoon leader asks his people to engage in life-threatening activities. You lose that when you put the mask on. You can't establish the eye-to-eye contact. You lose the facial expressions and the inflections of voice which are vital to leadership. As I mentioned before, the sense of isolation engendered by being cut off from the outside world and being in a warm place, causes the loss of continuity and comradery that is vital for a unit fighting on the battlefield.

We are finding this out in exercises that we and our allies have been doing in recent years. I believe it is a case of relearning certainly what the people in World War I knew very well and perhaps our own military knew back in the forties and fifties and early sixties.

I have spent some time on this issue because it is not a point that I believe is fully appreciated and partly because I am not sure that we have done as good a job as we might in articulating the dangers of one-sided use.

Again, we are able to better articulate this problem now if only that our forces are now spending more time in exercising and learning about the problem.

So, a one-sided use, even against a well protected opponent, can be decisive on the battlefield. The situation today, largely due to obsolescence of our delivery means, is that largely one-sided use is what would occur if the Soviets decided to use chemical weapons against U.S. and allied forces.

Our most critical lack is the inability to deliver persistent agents—by persistent, I mean chemical agents which would present a lethal hazard for more than a few minutes—beyond artillery range.

In our inventory today we have aerial spray tanks. It is a very efficient way of delivering chemical agents against undefended targets. You can pack a lot of agent into a large container. Unfortunately it does not have a role on the modern battlefield in the age of modern air defense.

They were perhaps effective 20 years ago, but today it is not a survivable mode when the pilot has to fly directly over the target in level flight, relatively slow, for long periods of time.

We do not have any bombs with persistent agents, we do not have any rockets with persistent agents.

The Soviet Union has spray tanks like we do. We believe those would be ineffective as ours are. However, they also have bombs with persistent agent and they have surface-to-surface rockets with persistent agent.

That means the Soviets can target, contaminate and either cause extensive casualties or force this very severe degraded posture on allied airfields, ports, supply depots, command and control centers, and air defenses. I will give you an example of what happens. During the summer months too, our ability to generate sorties from an air base attacked by conventional and chemical ordnance, conventional to put holes in the runways, persistent chemicals pose a lethal threat. During a several-day period, depending on assumptions that you make, we might be able to generate only 10 to 40 percent of the sorties that you would in a normal combat environment.

So, at least a factor of 2 loss of our Air Force effectiveness, and perhaps a factor of 10, by a one-sided use of chemicals.

I do not believe I need to highlight very much how devastating and decisive that can be in a war in Europe.

Again, perhaps a little longer summary than I intended, as to why defense isn't enough, why we need another element of our deterrent policy.

Moving on to the second element—demilitarization—which is the name that we give for the safe disposal of obsolete chemical agent and munitions. That is a rapidly growing effort. We are asking for $150 million in fiscal 1985. That is up a factor of two from fiscal 1984.

A large part of that is to build and then eventually operate a large-scale demilitarization facility at Johnston Island where a number of obsolete munitions are located.

The technology for the Johnston Island facility came out of our pilot plant at Tooele, Utah, where for several years we have been conducting research and development into safe disposal technologies.

Several years ago we gave an estimate of $3 to $4 billion to dispose of our entire current stocks of unitary munitions.

Our R&D efforts have borne some fruit and today our estimates are in the neighborhood of $1.8 billion to dispose of the entire stockpile.

We have an ongoing research and development effort. We would like to be able to get the cost still lower. Our goal is to get it close to a billion dollars which is still expensive. The reason, of course, is to ensure safety.

The problem is not just getting rid of the agent. It is getting rid of all the metal parts that have been contaminated with the agent; and particularly if it is munitions where you can have metal parts and agent and propellant and explosive in an intimate mixture. Ensuring containment of that rather unhealthy mixture is very expensive.

So, our demilitarization program is an active one, a very strong one. During the 1970's we got rid of a great deal of agent. As a matter of fact, we got rid of more agent than we would build during the next several years if the Congress gave us all the money we asked for, for the binary program.

In many ways the highlight of our demilitarization activities last year was the workshop we cosponsored with the Arms Control and Disarmament Agency in Utah where we had 50 foreign participants to join with the United States to look at ways to verify the destruction of stockpiles.

Again, we are very pleased and proud to be able to have cosponsored that and the Army did a superb job in running it.

I finally come to the retaliatory part of our program which represents about 14 percent of our budget request, about $163 million.

Part of the research and development, about $32 million, part of it for maintenance of our current stockpile.

Then we have $105 million which is for preparation for production. This is the part where it markedly differs from what we have asked for the last 2 years. Again, if you remember, the money for that was authorized last year, but not appropriated. As Rich Wagner has said, we have tied our program in a meaningful and coherent way to the arms control initiatives and we are limiting our request this year to activities which would allow us to produce relatively rapidly in the future if this Nation decides to produce chemical weapons.

We are deviating from the normal DOD practice of full funding of weapons and I think the special case of chemical weapons deserves such a deviation. Therefore, this $105 million basically includes the long poles in the tent.

So, it is that portion of the production base, the building of certain equipments which are the longest lead-time items, and it includes the portion of the munitions themselves, the metal parts, which are the longest lead-time items.

The $105 million will give us a partial production base and will give us some components of the weapon. It will not give us a single complete chemical weapon. It will not even give us a complete production base. It will not complete the facility at Pine Bluff which would be needed to load and assemble the Bigeye. It will not complete the facility needed to produce QL, the critical ingredient.

Nor would it, of course, provide any of the funds for final assembly. The produce munitions at some future time the President would have to come back to Congress and request additional moneys, the money needed to complete the round started in fiscal 1985 is approximately $60 million.

So, the President will have to request that and Congress at some future time would have to again authorize and appropriate that money.

I have no doubt, myself, that at this time this approach offers the best path and support of our arms control measures. This Nation has tried hard to get an arms control treaty for many years while at the same time freezing production of chemical weapons.

That approach has not given us the treaty we all want. What it has given us is a greatly eroded capability to deter chemical warfare.

I believe that this year going as fast as we can, without any restraints at all, probably is also not the best path if there is any hope in arms control. If there is any hope that the Soviets might be serious, and there are at least a few recent signs that they might be least willing to get more serious in talks, then this restrained approach, I think, sends the best signal.

It signals our desire for an arms control solution of the chemical threat. It signals our restraint in this matter. It would be more than 2½ years before the first chemical weapons can be produced and then, as I mentioned, only if Congress gives additional money.

But at the same time it signals some resolve that the United States is prepared to take steps to end this very dangerous asymmetry that we have allowed to grow and it provides insurance that if we cannot get the treaty we all want, then we can move in a relatively rapid manner and restore a credible deterrent.

On that note I will conclude my remarks and turn it over to Mr. Emery.

[The prepared statement of Dr. Gold follows:]

PREPARED TESTIMONY OF DR. THEODORE S. GOLD, DEPUTY ASSISTANT TO THE SECRETARY OF DEFENSE (CHEMICAL MATTERS)

We are here today to discuss the Department of Defense's role in the administration's efforts to eliminate the threat of chemical warfare. Our role includes active support of the nation's attempt to achieve a complete and effective ban on chemical weapons and responsibility to restore and maintain a deterrent until we can achieve such a treaty.

A critical element needed for deterrence is a credible retaliatory capability. The United States has not produced any chemcial weapons for 15 years; consequently, largely due to obsolescence of delivery means, our current stocks of aging weapons have little military value today. During this same period the Soviet Union continued to produce chemical weapons and expanded its capabilities to wage chemical warfare. The Congress, in spite of the efforts and recommendations of this committee, did not provide the funds we requested the past two years to reestablish an effective retaliatory capability.

The issue is not one of being for or against chemical weapons. I believe all Americans are united in our abhorrence of chemical warfare. The issue is how best to assure that chemical weapons are not used against the men and women of our armed forces, are not used against our allies, and indeed are not used against people anywhere. The historical evidence, particularly the non-use in World War II, indicates that possession of a credible retaliatory capability in conjunction with protective measures is an effective deterrent.

Our lack of such a retaliatory capability today is increasingly dangerous. The dangers of the asymmetry in NATO/Warsaw Pact chemical weapons capabilities are dramatically depicted in a recent DOD-sponsored classified report written by a score of retired flag-rank military officers led by General Frederick Kroesen. The asymmetry in NATO/Warsaw Pact chemical weapons capabilities allow Soviet forces to operate largely unencumbered by protective equipment and posture while U.S. and Allied forces can be shackled by the severe restrictions of such equipment and posture. The effect of such one-sided use can be devastating, severely hampering our ability to defend positions, resupply, treat casualties, lead troops, generate and fly air sorties, repair equipment and perform other critical wartime tasks.

Thus, the current chemical weapon asymmetry can nullify our efforts to improve our conventional forces. By negating these improvements, it will increase our reliance on threatening a nuclear response to deter non-nuclear conflict. This is the wrong direction! I believe all Americans want to decrease, not increase, such reliance.

Finally, our lack of a credible retaliatory capability provides no incentive for the Soviets to conclude a chemical arms ban. The Soviet Union leaders are practical men, who will not give something away. For years the United States has tried to achieve an effective chemical arms ban while unilaterally freezing production and allowing our capabilities to erode. This approach has not worked.

The fiscal year 1984 Defense Authorization Bill provided an alternative approach offering greater possibility for successfully obtaining an effective ban. Our fiscal year 1985 request for the retaliatory element of our program follows the path established by last year's Authorization Bill. We are not asking for monies to produce chemical weapons. We are requesting funds to prepare for production. Production could not occur without subsequent Congressional approval and additional funding.

This approach, providing a balance between restraint and resolve, offers a sound path toward achieving our objective of eliminating the threat of chemical warfare. It reflects our desire for an arms control solution to the chemical threat and allows an opportunity to achieve a treaty before any weapons are produced. At the same time, it provides an incentive to the Soviets to negotiate seriously (by signaling our resolve to take steps necessary to eliminate the current Soviet advantage). It also provides insurance in case we cannot achieve an effective treaty.

The need for the United States to act to eliminate the threat of chemical warfare is unfortunately illustrated by the proliferation of chemical weapons use in the world. Militarily, proliferation reinforces our requirement to deter chemical weapons use against us or our allies in areas other than NATO. Of equal importance, proliferation shows that lack of expressed world concern and resulting lack of concerted action by the international community in response to chemical and toxin use engenders the spread of such use. We have demonstrated our abhorrence of chemical warfare by the lead we took to draw worldwide attention to the use of chemical and toxin weapons in Southeast Asia and Afghanistan. Regrettably, we are again faced with chemical weapons use in the Iraq-Iran conflict. The best solution to chemical weapons proliferation is a complete, worldwide ban on these weapons. We have demonstrated our restraint through our unilateral freeze on chemical weapons production for 15 years. We will continue to demonstrate restraint. However, U.S. restraint by itself has not eliminated the threat of chemical warfare. It has not brought us a chemical arms ban. By itself it will not induce the Soviets to conclude a treaty, to cease their production, to destroy their weapons.

In our testimony last year we described what we believed was the considerable common ground within the United States with regard to the chemical weapons issue. The subsequent congressional debate generally supported our perception, i.e., that there is widespread acknowledgement of the need to possess chemical weapons as a deterrent. The contentious issues—at least as reflected in the recorded debates—are the inadequacy of the current stockpile and the performance of the Bigeye binary bomb. In our testimony this year we will focus on these issues as well as summarizing our fiscal year 1985 program and describing significant activities, including arms control, of the past year. Before moving on to these topics, I will first review U.S. policy with regard to these weapons.

It is important to note that we are not seeking to change U.S. change. Our policy continues to be to seek an arms control solution to the chemical threat, and in accordance with international treaty, not to possess any biological or toxin weapons. Further, and again in accordance with international agreement, our policy for many years has been to possess chemical weapons for deterrence until we can achieve a complete and verifiable ban. Finally, it is U.S. policy that we will never use chemical weapons first. Rather, we would consider use only if they were first used against us or our allies and then only in a proportionate manner for the sole purpose of discouraging further use.

This is a sound and prudent approach consistent with widely held views on just wars and morally permitted actions. For example, Michael Waltzer, in his book *Just and Unjust Wars,* wrote that "Winston Churchill was entirely justified when he warned the German government, early in World War II, that use of gas by its armies would bring an immediate Allied reprisal."

President Roosevelt issued the following similar warning in 1943: "I have been loathe to believe that any nation, even our present enemies, could or would be willing to loose upon mankind such terrible and inhumane weapons . . . We promise to pay any perpetrators of such crimes full and swift retaliation in kind and I feel obliged now to warn the Axis armies and the Axis people in Europe and Asia that the terrible consequences of any use of these inhumane methods on their part will be brought down swiftly and surely upon their own heads."

Thus, the threat of proportional retaliation is both morally justifiable and effective in deterring the use of these weapons.

The issue, therefore, is not whether to have a chemical weapons stockpile, but what kind of stockpile. The current stockpile of aging munitions and agent has inherent deficiencies which cannot be remedied by any maintenance program. The current stockpile is hazardous to handle and move, and it lacks essential military capabilities. We can replace this stockpile with one smaller, safer, and much more militarily effective. By taking steps now to prepare for such replacement, we provide necessary support for ongoing U.S. chemical arms control initiatives.

ARMS CONTROL EFFORTS

The United States continues to be extremely active on the chemical arms control front. As you recall, in February 1983 the Vice President addressed the Committee on Disarmament (CD) in Geneva and reaffirmed U.S. commitment to a complete and verifiable chemical weapons ban and exhorted member nations to accelerate their efforts toward this goal. At that time the U.S. also submitted to the CD a paper providing our detailed views of the contents of a verifiable ban. From personal observation I can attest that these U.S. initiatives provided the major focus for chemical arms control activities in the CD during 1983.

We followed up these efforts with another major paper on verification of stockpile destruction during the 1983 summer session of the CD. Then in November we hosted an international workshop on this subject at the Tooele Army Depot in Utah. Almost 50 foreign participants from 29 nations attended. (From the Soviet bloc, only

Romania accepted our invitation and participated). The highlight of this extraordinary event was the destruction of chemical munitions, along with a demonstration of the types of measures we believe necessary for verification of destruction (including permanent presence of a small number of international inspectors as well as sensors and other instruments).

On 18 April 1984, the Vice President submitted a U.S. draft treaty for a comprehensive worldwide ban on chemical weapons to the CD in Geneva. The draft treaty, based upon the February 1983 U.S. detailed views paper, would prohibit development, production, possession, transfer, and use of chemical weapons. Verification of compliance would be accomplished by a combination of national and international measures including systematic and challenge international on-site inspections.

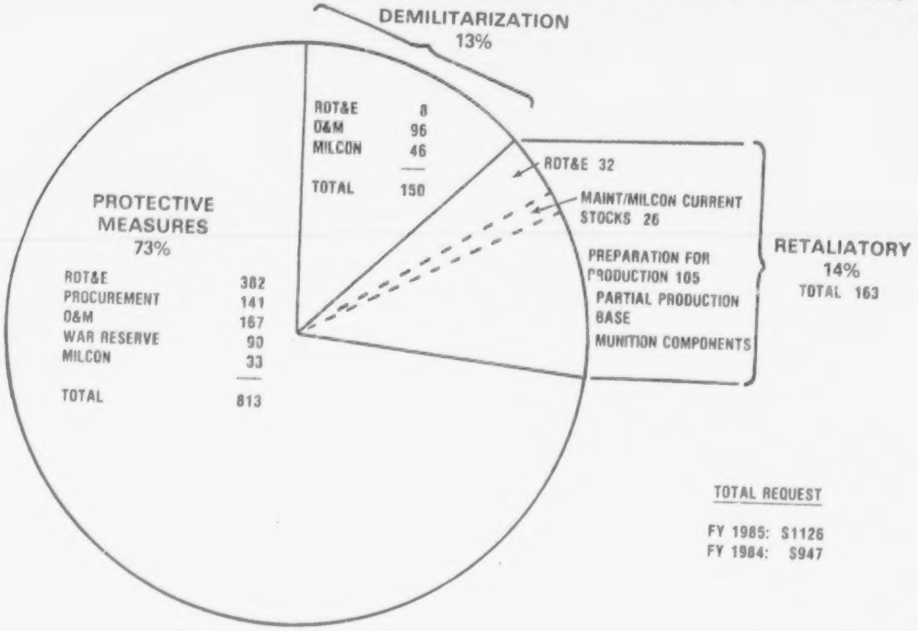
Unfortunately, the Soviets have yet to match U.S. enthusiasm or initiatives for a chemical arms ban. There are, however, some recent signs of possible movement on their part. In August 1983, they indicated acceptance of the principle of international on-site inspection (albeit only for one of the several critical verification issues, stockpile destruction, and only on a quota system which we view as inadequate). More recently they announced a willingness to consider the concept of the permanent presence of inspectors during stockpile destruction.

If these are indeed signs of Soviet seriousness to conclude a verifiable chemical arms ban, they are most welcome. Formidable obstacles and differences remain. An effective treaty not only requires verification of destruction of declared stocks, but also verification of destruction of declared production facilities, verification that permitted activities are not used to violate the treaty, and finally, and most difficult, verification that there are no clandestine stocks or facilities. There must be a high confidence that no party to a chemical weapons ban could achieve a chemical weapons monopoly without detection.

The Department of Defense will continue to play a major role in support of U.S. chemical arms control initiatives. Working with ACDA and other involved agencies, we helped prepare the draft treaty. As Secretary Weinberger wrote to this committee last year, "We all want a complete ban—our military personnel who must face these weapons, more than most."

FISCAL YEAR 1985 PROGRAM

FY 1985
CHEMICAL WARFARE DETERRENCE PROGRAM ($M)



Our fiscal year 1985 budget request for the chemical warfare deterrence and biological defense is approximately $1.1B ($1,126M) divided among the three major program areas—protective measures, demilitarization, and retaliatory (Figure 1). As in the past, the preponderance of the funds ($813M, 73 percent of the total request) are for chemical and biological protective measures. We are also requesting $150M (13 percent) for demilitarization, and $163M (14 percent) for retaliatory programs. Of the $163M for the retaliatory element; $32M is for research, development, test and evaluation; and $26M is for maintenance and construction efforts for the current stockpile. The remainder ($105M) is to prepare for production of new munitions and represents nine percent of our total request. Our request, if approved, will allow us to move ahead at a rate consistent with military requirements, available technology, and overall defense priorities in the protective and demilitarization areas. However, in the retaliatory area, we are proceeding at a deliberate, restrained pace, reflecting Congressional concerns, while supporting our deterrent, and thus, our arms control objectives.

PROTECTIVE PROGRAM

Almost half of the $813M we are requesting for chemical and biological defense is for research and development of improved protective equipment and supplies. As you are well aware, we have a number of deficiencies in our protective capabilities which require new items. Our goal is to reduce the burden of operating in a chemical protective posture. Areas of emphasis include individual and collective protection; detection, warning, and monitoring; decontamination; and medical.

The remaining funds ($431M) are to procure available protective materiel and facilities required for the Services to maintain and improve their ability to survive and operate in a chemical warfare environment.

The services are planning to acquire a variety of chemical and biological defense items in fiscal year 1985. All services will be purchasing protective clothing, detection and decontamination kits and spare parts (approximately $265M). The Marines will be procuring decontamination and detection equipment ($4M), while the Navy will be acquiring infrared chemical detectors ($14M) and protective masks ($8M). The Air Force plans to procure protective masks ($15M), Survivable Collective Protection Systems ($18M), Automatic Liquid Agent Detectors ($6M) and Lightweight Decontamination Systems ($3M). Army procurement includes protective masks ($44M), training alarms ($1M), Lightweight Decontamination Systems ($3M), Chemical Agent Monitors ($8M), and Modular Collective Protection Equipment ($9M). The Air Force is requesting $13M in MILCON to install filters and air locks on critical buildings in Europe, which have been built with NATO funds (the chemical protection portion of those construction projects is a national responsibility). Finally, the Army has a $20M construction project for a modern laboratory at Edgewood Arsenal, MD.

We continue to cooperate extensively with our allies on chemical defense programs. In the mid-1970's most of our protective clothing was bought from the British. In more recent times, we have tested a variety of protective items from several countries. The Norwegian Sanator, a decontamination device, is in procurement through a U.S. licensee. We are enthused about the UK's Chemical Agent Monitor (CAM) which we are evaluating and plan to procure. I was also very impressed by the Fox (demonstrated for me during a recent trip to Europe), a German armored reconnaissance vehicle with an on-board mass spectrometer for chemical agent detection and identification. We are in the process of acquiring units for evaluation. The Navy bought a small number of protective suits from the UK (in 1983), because it was the best available item for their unique (shipboard) needs. More extensive procurement was blocked and delays were incurred while U.S. licensees were sought.

On the other side, foreign nations have acquired U.S. detectors and protective equipment. Several countries have expressed interest in the Air Force's Survivable Collective Protection System, which is similar to a system developed by the French. There are also a large number of technical exchanges through our alliances and bilaterally.

Although not sufficient by itself, chemical protection is an essential element of deterrence. In our efforts to reestablish a credible deterrent, we have made major investments in protection. Our efforts first concentrated on fielding a basic survival capability. We have nearly accomplished this objective, although the Navy is still working on their initial issue of protective suits. Our efforts are now directed at reducing the problems caused by the protective equipment itself and improving our ability to sustain operations in a chemical environment.

We are grateful for the congressional support of our efforts to acquire a chemical defense capability. However, I will note an exception to this support. Last year Congress did not appropriate funds that were authorized for construction and procurement of Air Force collective protection systems. (Collective protection is the term used for buildings and devices which provide clean areas where personnel can survive without masks and protective clothing.) The Air Force is tied to its runways. Their people must stand and fight from their fixed installations; they cannot move away from the chemical contamination. They are easily targeted by chemical munitions and the contamination from persistent agent and follow-on attacks could last for days, while people can last in protective clothing only as long as they can go without food, sleep or performing other bodily functions. Collective protection is critical if our tactical Air Force is to last more than a few hours in a chemical environment, and our Air Force is an essential element if we are to prevail in any potential conflict with the Soviets. A report describing the Air Force collective protection program was forwarded to Congress earlier this year.

Regarding the acquisition of chemical protective items, there has been criticism of the acquisition process, and particularly how long it takes to get improved equipment to the field. Although some of this criticism has come from the press or other outsiders, the greatest volume and by far the most incisive criticism has come from within the Department and the military. I would like to provide some background on the problem and then mention some of the initiatives underway to improve the situation.

When assessing the current situation in chemical warfare programs, it is important to remember recent history. This nation intentionally deemphasized chemical warfare during most of the 1970s in the belief that we could negotiate away the problem. The research, development and acquisition base; the training and doctrinal base; and the management base for the chemical program were essentially dismantled. When we realized that the Soviets had not shared our restraint and that our forces faced a threat which they were unprepared to handle, it was necessary to take steps quickly to redress the most severe deficiencies. To illustrate the severity of the problem, it is now possible to say in unclassified forum that as late as 1977 the U.S. Air Force could not launch a single combat aircraft under chemical attack conditions. Clearly, we could not wait the years necessary to reestablish an adequate technical and management structure before we took action. Certainly mistakes were made. However, today, U.S. forces can at least survive a chemical attack and have some, albeit limited, capability to fight in a chemical environment. That is an enormous improvement over the situation in the mid to late 1970's.

This is not to say that we are satisfied with the current situation. We are not, and we have taken and are continuing to take steps to improve it. There are now established chemical focal points in OSD, the JCS, the Services, the joint commands, and the major subordinate Service commands. There is an established DOD CW Steering Committee, as well as interagency groups. We have clarified the objectives and guidance for the military, and we review their budgets and programs. We have undertaken several special reviews on subjects such as Bigeye,the current stockpile, demilitarization, and the development and acquisition process. At my request, the American Defense Preparedness Association (ADPA) sponsored last June a working conference on ways to improve chemical materiel acquisition management. We are now working to implement recommendations. The Services have been working together and are nearing completion of a new joint Service agreement on chemical research and development designed to increase cooperation and make the system more responsive. The Army has undertaken a cooperative effort between their users and developers to examine ways of expediting the fielding of chemical defense materiel. Also, the Joint Logistics Commanders (the four-star generals from each Service responsible for development and acquisition) are working together to find ways to improve the process. Although much remains to be done, we are making progress in reestablishing a sound managerial, technical, and doctrinal basis for chemical programs and expect these to lead to greater efficiency and military capability.

RETALIATORY PROGRAM

In the chemical weapons area, our fiscal year 1985 budget request differs significantly from last year's. Last year, we requested funds for all the facilities needed for initial production of the 155mm binary artillery projectile and the Bigeye bomb and for initial production of complete, usable 155mm artillery projectiles. This was in accordance with the normal DOD practice of fully funding procurement programs—particularly ammunition programs. As you are well aware, chemical weapons modernization has been an extremely difficult issue for several years, and last year after intense debate the program was authorized but not funded.

The fiscal year 1984 Authorization Act, while authorizing the program, imposed a number of restrictions. It precluded stockpile growth by requiring that a serviceable artillery projectile be rendered useless for each new binary munition produced. It also emphasized a concern for arms control by imposing delays on the execution of the program. It allowed preparations for production (facilities and the acquisition of munitions components), but the act specifically prohibited the final assembly of any weapons until 1 October 1985. Even then, assembly could not begin until the president certified to Congress that production remained in the national interest. We would have had to hold the funds for the final assembly (what we call load, assemble, and pack) until we were allowed to proceed.

The fiscal year 1984 Authorization Act struck a sound and effective balance between the need to redress a critical military deficiency and the desire to achieve what we all hope for—a complete, verifiable ban on these weapons. The act placed teeth in our resolve by getting ready to produce and by establishing a specific timeframe. On the other hand, it demonstrated restraint by delaying production and allowing time to achieve a treaty if the Soviets were to become willing.

In our fiscal year 1985 retaliatory modernization program, we have matched our request for funds to the intent of the fiscal year 1984 Authorization Act. We have asked only for those funds necessary to get ready to start initial production at some future time. The request includes time sensitive munitions components and portions of the facility projects. It is an intentional deviation from the normal full funding practice, a deviation which we believe was the intent of the fiscal year 1984 Act. The request does not include funds for complete facilities, for all the component parts, nor the load, assemble, and pack of munitions. Before any munitions could be produced, the Congress would have to authorize and appropriate additional funds for critical component parts, the assembly process, and for the remaining facilities. (Approximately $90M will be required to complete the required facilities, and $10M to complete the munitions started in fiscal year 1985.)

Our most critical stockpile deficiency remains a lack of an effective capability against targets beyond artillery range. Thus, the United States is faced with a situation where the Soviets can attack, contaminate, and severely degrade (or halt) operations at U.S. and allied airfields, ports, supply and maintenance centers, command and control facilities, and other vital combat support and supply functions. We do not have the capability to impose similar restrictions on them. This asymmetry can be decisive by negating our current and planned conventional force improvements and thus encourages the Soviets to employ chemical weapons. The Bigeye binary chemical bomb is vitally needed to redress this asymmetry.

The Bigeye program, from a technical standpoint, is in better shape this year. The problem (pressure buildup in the event the bomb could not be dropped after mixing) that delayed the Bigeye program has been addressed and the solution (not mixing until after the bomb is dropped) demonstrated. As you may recall, the problem arose in the fall of 1982. We subsequently reviewed the program and determined that the problem was solvable, but it was unlikely that we would be able to make and validate the changes in time to obligate procurement funds in fiscal year 1984. We so informed the congressional committees in hearings prior to any deliberations on the fiscal year 1984 program, and the President amended his budget request to delete procurement funds.

Based on testing to date, we expect that the Bigeye will perform as required and add an essential capability to our chemical deterrence posture. Consequently, we are requesting funds for a portion of the Bigeye production facilities and for munitions components. I am providing for the record a detailed technical status report on the Bigeye program which has been prepared by the Navy (which has responsibility for Bigeye development). (See p. 3589)

The retaliatory component of our chemical deterrent must have both effective long and short-range systems. Thus, in addition to the Bigeye we are requesting funding for M-687 binary 155mm artillery projectile components. The M-687 is fully compatible with modern artillery pieces, has greater range than the existing items and is much easier and safer to handle throughout its life cycle.

The present inventory of artillery projectiles is inadequate in type and capability. The potentially useful portion of the stockpile consists of 155mm and 8-inch nerve agent projectiles. More than half of these are filled with the persistent agent VX which is tactically unsuited to the Army's highly mobile aggressive defense doctrine. Further, the 155mm shells cannot withstand the higher propellent charges used with the modern howitzers and, thus, have a shorter range than high explosive shells or the new M-687 as it will be produced. The difference is approximately five kilometers which equates to a great number of targets which cannot be engaged.

Also, the current stockpile of artillery projectiles was produced between 1955 and 1968, and the agent fill is older than the munitions. During this long life, the agent fill has deteriorated and it is expected to continue to do so.

To help better understand the impact of deterioration we asked a distinguished group of experts in chemistry, metallurgy, and explosives to provide their assessment of the present and future physical condition of our artillery projectiles. Their report is provided for the record. Some of their findings were reassuring (munitions components appear to be in good shape today, no evidence of metallurgical degradation) while others were not (there is the possibility of catastrophic agent decomposition that would render the munitions almost useless by 1990, and concerns over flashing; i.e., agent burning during dispersal, which reduces or eliminates its effectiveness). On the key issue of the future condition of the munitions, the panel stated that there is insufficient evidence to reliably predict the condition in 1990. Their best estimate was that at least 50 percent of the agent, plus or minus 10 percent, should still be present by 1990. We do not find either the uncertainty or the best estimate reassuring, particularly when combined with the previously mentioned flashing and catastrophic decomposition concerns. They further stated that field tests including actual firing are necessary to have firm conclusions about munitions that have been stored for 14 to more than 30 years.

We are following their recommendations for additional laboratory testing and analyses that would sharpen our predictive capabilities (and considering their recommendation for field testing). On balancing, their findings, coupled to the existing deficiencies of improper agent mix, inadequate range and logistical and operational safety, support the need to at least take steps to be prepared to replace these rounds. We are proposing to take these prudent steps.

DEMILITARIZATION PROGRAM

Our program also provides for the disposal of chemical munitions and agents. This is a formidable task because of the agent toxicity, presence of explosives, and the need to destroy or decontaminate metal parts and other components that may have been in contact with the chemical agent. If a verifiable ban is achieved the United States will, of course, dispose of its entire chemical stockpile. We have the technology in hand to safely accomplish this task. In the absence of such a ban, and independent of decisions regarding new munitions procurement, we have planned to dispose of our unserviceable and obsolete munitions. Indeed, since 1972, the United States has safely demilitarized over seven thousand tons of chemical agent in munitions or in bulk containers. The weapons demilitarized include Honest John warheads, GB cluster bombs, some M-55 rockets, and hydrogen cyanide bombs as well as bulk agent.

The demilitarization program continues as planned to eliminate that portion of the stockpile with potential safety risks, while performing R&D to develop less expensive technology to dispose of the remainder of the stockpile. This year's budget request is for $150M. This consists of $46M of military construction funds for a demilitarization plant to dispose of stocks at Johnston Island, $8M for research and development, and $96M operations and maintenance (O&M) funds. The O&M funds are to procure demilitarization equipment, rehabilitate existing facilities for demilitarization purposes, operate the portable Drill and Transfer System (to handle leakers), operate the Chemical Agent Munition Disposal System (CAMDS, our technology development and test plant), and design and plan future demil sites and operations.

Our demilitarization program will first eliminate all BZ (an obsolete incapacitating agent), all rockets (obsolete and a potentially hazardous combination of munition, agent, explosive and propellent), and defective munitions. The pace of additional demilitarization will depend upon continuing safety studies, technical developments in cost reduction, and progress in arms control efforts.

The development program has been successful in reducing cost estimates and continues to promise further cost reductions. Cost estimates for destroying the rockets and other obsolete munitions on Johnston Island have decreased from $575M (in Oct 81) to $262M. The overall estimates for complete demilitarization of all stocks (from fiscal year 1984 on) has decreased from over $3 billion (in fiscal year 1981) to $1.8 billion (current), with substantial further reduction expected from on-going R&D efforts. Finally, and perhaps most significantly, the demil program has begun to take an explicit and important role in supporting our arms control efforts. As I mentioned earlier, a major U.S. initiative of last year was our efforts on demilitarization verification highlighted by the international workshop we sponsored last fall at the CAMDS facility at Tooele, Utah. The workshop was both a technical and diplomatic success, contributing to our arms control efforts, and surely being a factor in the Soviet indication of willingness of discuss permanent on-site verification of stockpile destruction.

CONCLUSION

Chemical weapons are not a pleasant subject. Emotions run high, and facts become obscured. In spite of the clearly identified and widely shared goal of eliminating the threat of chemical warfare, the abhorrence of this subject makes public discussion of means to achieve our objective extremely difficult. It is not sufficient to say "do nothing" or "wait a little longer" on the retaliatory component. It is not sufficient to accuse the "military" of an irrational desire for new and more terrible weapons. The "military" is the sons, daughters, mothers, and fathers of your constituents. They share an abhorrence of chemical warfare and desire for an effective chemical arms ban. They do not want to be threatened or attacked with chemical weapons.

How do we deter chemical warfare without effective chemical weapons? How do we motivate the Soviets to negotiate away an unchallenged superiority? The men and women of the Armed Forces and the American people deserve answers. Our approach couples an aggressive pursuit of a chemical arms ban and improved chemical protection with a restrained program to reestablish a credible retaliatory deterrent. Those who oppose this solution need to offer real alternatives.

A 15-year unilateral freeze has not brought an elimination of the chemical threat, rather it has brought us to a dangerous situation. This is not merely my judgment. It is the judgment of General Vessey and all of the Soviet Chiefs. It is the judgment of General Rogers, the Supreme Allied Commander in Europe. It is the judgment of the Commander-in-Chief, U.S. Forces in the Pacific; the Commander-in-Chief U.S. Central Command; and the Commanders of U.S. Army, Navy, and Air Force in Europe. To my knowledge, it is the judgment of all our senior military commanders.

I urge members of Congress to take the time and effort to examine this issue. To those skeptical of Pentagon bureaucrats, go to our military people in the field. Talk to the men and women of our Armed Forces about the effects of chemical attack. Observe the training against chemical attacks. Better still, share the experience. Wear the protective gear. Participate in a decontamination exercise. Listen to our senior Commanders' grave concern about our current lack of an effective deterrent. Talk also to our negotiators and others in Geneva working hard to achieve a verifiable ban on chemical weapons. Do these and then support the course of action that will best achieve what we all desire—the elimination of the threat of chemical warfare.

[The Bigeye Binary Chemical Bomb Technical Status Report follows:]

THE BIGEYE BINARY CHEMICAL BOMB—TECHNICAL STATUS REPORT, MARCH 23, 1984

BASIC CONCEPT

Two relatively non-toxic chemicals are mixed when the weapon is enroute to the target to form a chemical warfare agent. Until that time, the two component chemicals are kept physically separated, resulting in improved safety throughout the entire life cycle of the weapon (from the manufacture through storage, transportation, and handling to eventual destruction), compared to unitary munitions which contain actual chemical agent.

BIGEYE DESCRIPTION

The Bigeye is a 500 lb. class gravity bomb which contains a relatively non-toxic liquid (QL) in the bomb case. The second chemical is powdered sulfur contained in a cylindrical tube (ballonet). The ballonet will be stored outside the bomb and only inserted in the weapon after chemical retaliation has been authorized, and then just prior to a retaliatory mission. The sulfur is injected into the QL after the bomb is released from the aircraft, and then it mixes rapidly to form about 200 lbs of the highly persistent nerve agent VX. At a preselected altitude, dissemination ports open, and the VX sprays out as the Bigeye descends.

VX is a highly lethal nerve agent that persists for days or weeks, depending on the weather, and requires full protective clothing and extensive decontamination. The VX produced in Bigeye would be the same as the unitary VX which was used as fill for older chemical munitions.

The Bigeye bomb would be considered for use only in retaliation against chemical or biological attack and could be employed against enemy forces within the combat radius of the delivery aircraft. It will be able to be delivered by Air Force, Navy, and Marine Corps aircraft including the F/A-18, A-4, A-6, AV-8, and F-4, F-16, and F-111. The bomb has standard suspension lugs and could be carried by any aircraft capable of carrying similar conventional weapons. A single aircraft can carry a dozen or more Bigeye on multiple ejection racks.

BIGEYE DEVELOPMENT HISTORY

The Bigeye program dates from the 1960s; however, it was suspended in the early 1970s and restarted in 1976. The Navy has the lead for development and is executing the program through the Naval Weapon Center (NWC), China Lake, CA.

The Bigeye program, like other development efforts, identified and resolved design and hardware problems during development. Problems with weapon release from the aircraft and with some components (including the hot gas motor and generator) were identified and solved without impacting the schedule and within programmed resources. Two recently identified problems (with the central injector and the fuze in a simulated high intensity electromagnetic environment) are being resolved with no expected impact on schedule or resources. However, one problem, involving internal pressure build-up after arming, did impact the schedule and required additional development resources to resolve.

The original Bigeye bomb concept called for the pilot to initiate mixing of the QL and sulfur a minute or two before dropping the bomb. By the fall of 1982, the bomb had successfully met a number of its performance requirements, including agent generation and aircraft separation. However, in October 1982, a test to explore one specification (safe carriage of a mixed Bigeye) showed that if the bomb was warm enough when mixing started, sufficient pressure could build up inside after a period of time to cause the rear seal to fail and release agent. This would not affect peacetime safety or wartime safety up to the time the pilot mixed the bomb. It would constitute a problem only if the mixed bomb could not be dropped as planned due to mechanical failure of the release mechanism or an aborted mission. While these are low probability events, they do occur, and the risks were judged to be unacceptable. Therefore, the employment concept was changed to mix the QL and sulfur (making VX) only after the bomb is released from the aircraft. (This new configuration is called "off-station" mixing).

Two changes were required to adapt the Bigeye for off-station mixing. One, a radar proximity fuze, was added to provide greater efficiency in dissemination of the agent. The proximity force will ensure that the agent is always delivered at a set altitude above the ground and therefore stabilizes pattern size and density. The fuze selected to provide this function is the FMU-140/B. The FMU-140/B is a repackaged version of a current Air Force fuze which has been in production for some time. Repackaging reduced the length of the fuze to allow full use of multiple ejection racks with Bigeye.

The other change required to modify Bigeye for off-station mixing was the addition of a self-contained power device for initiating the mixing process. With the modified mechanism installed, mixing is initiated by a lanyard when the weapon falls away from the aircraft. Action by the pilot is also required to arm the lanyard mechanism; an accidentally dropped bomb will not mix.

With off-station mixing, Bigeye will never contain toxic agent prior to being intentionally dropped toward the target. This change eliminates the risks associated with carrying a mixed Bigeye (or the current VX spray tank) aboard an aircraft.

TEST PLAN

Bigeye is being tested under realistic conditions—in the air for aerodynamics, dissemination, function, and safety; on the ground for safety, logistics, function, and operational suitability; and in an environmentally controlled chamber for generation of chemical agent. As of mid-January 1984, there have been 50 aircraft separation flight tests, 6 dissemination flight tests, 4 off-station mixing flight tests, 10 environmental system tests, and 24 toxic agent chamber tests. By the end of the program, more than 150 flight tests (with simulants in place of the actual agent), a large number of component and subassembly tests, and 40 chamber tests in which VX is produced in a weapon configuration will be conducted.

The additional testing necessary to validate off-station mixing has two major elements. The first was a series of flight tests with simulants to assess the impact of mixing in free fall on weapons stability and dissemination. The second is a series of toxic chamber tests to define the rate at which VX is generated at various temperatures.

The four planned flight tests to demonstrate the feasibility of mixing after release have been successfully conducted at NWC, China Lake. This series assessed the impact of mixing action on weapon stability and dissemination. The first test was on 31 May 1983, and the weapon was dropped from 6,000 feet in order to allow prolonged observation of flight characteristics. The second and third tests were at low altitude to demonstrate the feasibility of off-station mixing in high threat air defense environments. In a 7 July 1983 test, an A-4 used a 250-foot altitude run in; and on 22 August 1983, an A-6 started the release maneuver at 145 feet. In the latter test, the weapon was released from the worst case position on a fully loaded multiple ejection rack. On 14 September 1983, a weapon was released from a 500-foot run in using an A-6 aircraft. The weapon included an optical telemetry device which measured the rate of mechanical mixing. This test confirmed that mixing is not adversely affected when the weapon is in free flight (prior to the change to "off-station" mixing the weapon was held fixed to the aircraft during mixing).

Five of seven toxic chamber tests in support of the off-station mixing approach have been conducted at the Chemical Research and Development Center. The first showed that a simple change to the Bigeye mixing system improved and accelerated mixing efficiency. The subsequent tests assess agent generation at the full range of operationally significant temperatures. Testing to date indicates that effective delivery of Bigeye will be possible in all relevant circumstances.

A Technical Evaluation, scheduled for the spring of 1984, will finish the developmental testing of the Bigeye using developmental test weapons which simulate the tactical configuration of the weapon. One series of tests, using simulant-filled weapons, will measure and validate the dissemination patterns. Additional weapons will be subjected to the most severe environments in which Bigeye is expected to operate during its lifetime—including high and low temperatures, shock, vibration and humidity. Other tests will subject Bigeye to the electromagnetic environment and the rigors of catapult launches and arrested landings which the weapon will experience in the Navy aircraft carrier environment. Safe aircraft separation will be evaluated, in a series of 66 tests, using both Navy and Air Force aircraft and a variety of delivery maneuvers and procedures.

Following Technical Evaluation, the Bigeye will undergo a separate and independent evaluation by the Navy and Air Force operational test organizations. This Operational Evaluation will test for effectiveness and suitability using 60 simulant-filled test articles.

IMPACT OF CHANGE

The change to off-station mixing does not affect the chemistry or basic design of the Bigeye. Further, it does not affect the load, assemble, and pack facility, the production of the chemical components or the major metal parts tooling. Off-station mixing requires changes in "bolt-on" components such as the fuze.

The Air Force has assessed the delivery tactics appropriate for off-station mixing and has concluded that they do not degrade aircraft survivability in an air defense environment and in many cases reduce expected attrition.

Senator **Quayle**. The distinguished Chairman has arrived along with two other Senators.

What I would like to do, with the Chairman's permission, is go ahead with Mr. Emery's statement on the arms control aspects and do as much as we can in open session and open it up to questions. Then we can go into closed session for General Kroesen and his intelligence assessment.

Senator **Warner**. That is agreeable.

I am sorry I was delayed. I had to testify before the House of Representatives this morning.

Senator **Quayle**. You may go ahead, Mr. Emery.

STATEMENT OF DAVID EMERY, DEPUTY DIRECTOR, ARMS CONTROL AND DISARMAMENT AGENCY

Mr. **Emery**. First I want to thank you and the committee for the opportunity to testify this morning, representing the Arms Control and Disarmament Agency.

Let me say that we consider this to be one of the more important areas in which arms control activities have gone forward.

I have a prepared statement which I will submit for the record. Reading the statement would take too much time away from questions that I am sure you and the others will want to ask. Let me summarize just briefly.

First of all in the written testimony there is, I think, a rather interesting and extensive history of chemical weapons use dating back to the late 1800's and concluding with some of the more recent findings that are very relevant to our discussion.

I will not attempt to summarize those now in the interest of time except to say that the chemical weapons use that we have identified in the Iraq-Iran war, various instances which have occurred in Southeast Asia and other places, are, I think, ample evidence that it is important to humanity that the United States take the lead and cooperate with all of the nations who are sincerely interested in eliminating these horrible weapons, in devising a means whereby existing stockpiles can be identified and destroyed, where manufacturing facilities can be destroyed, where we can limit to the greatest extent possible the likelihood that clandestine facilities for manufacture and storage of chemical weapons can exist.

That, of course, is the goal of the treaty proposal that Vice President Bush presented to the Conference on Disarmament in Geneva a few days ago.

I was there, I participated in that activity, and I must say that the initiative that we have presented was received very well by the members of the Conference on Disarmanent, I must be candid and say not without some questions, not without some suggestions, which is only reasonable in an international forum of this sort.

But I think that the presentation of this treaty at this time has helped the United States immeasurably, it has given us a major boost in our arms control initiative, and I must say I have been very heartened by the level of support and understanding not only from our traditional allies, but also from some other nations who recognize the problem and who also are trying to find a viable solution.

During the last 15 years or so we have not added to our stockpile. We have not modernized it.

In fact, in other ways, including the defensive technologies that Dr. Gold mentioned, unfortunately we have not necessarily spent the money and the effort and the research and development time that we should have in learning ways to defend American and allied forces against possible chemical use.

We are also facing a situation which is certainly one for the Armed Services Committee to consider wherein the Soviets have in fact modernized. They have developed a variety of chemical weapons and delivery techniques, defensive measures and the like, which we believe give them a very substantial advantage indeed over U.S. and allied capabilities.

To that end we feel that arms control also has to be coupled with some very basic, what I believe to be a common sense, understanding of the military balance. That is, it is simply not good for the United States and its allies, in fact, it is destablizing for one side to have a massive chemical weapons advantage, for the other to have an aging chemical weapons stockpile that may in fact not be equal to the task of deterrence.

When you consider the other very complex military problems that we have in Europe, the balance between NATO and Warsaw Pact, for example, certainly we must avoid at all cost a situation where there are pressures to go nuclear in order to deter a chemical attack from the East.

We consider that to be a very important factor and one that argues very strongly for the two-track approach that the administration has presented, one being arms control first and foremost, giving us a means to eliminate all the horrible weapons and thereby eliminating the threat, but in the event that arms control fails, if any negotiations do not go forward or that verification is not sufficient to guarantee compliance, then we must demonstrate that we have the technology and the will power to give ourselves a minimum chemical deterrent so that the Soviets or others will know that the prices for using chemical weapons first would be the possibility and in fact the likelihood of retaliation in kind.

That is a deterrent philosophy that we have embraced for nuclear weapons. As a matter of fact, in the chemical realm there is ample evidence that in fact that very philosophy worked successfully in World War II because although both sides had chemical weapons and theoretically could have used them, even in the closing days of World War II when Hitler's Third Reich was crumbling, the decision was never made by the Germans to utilize chemical weapons against the invading allies.

In World War I, however, chemical weapons were used extensively and I think that we have an obligation not only to explore the various possibilities of arms control, but also to insure until we are able to guarantee that we are eliminating chemical weapons and moving to a much lower level of danger, that our opposition will know that the United States will maintain a minimum deterrent.

I should say in that regard that we do not want to build up huge chemical weapon stockpiles. Dr. Gold mentioned that is not our intent. We are interested in replacing older systems that we believe are less effective with systems that are newer and safer, safer for us, safer to handle, safer to store, easier to maintain, weapons that we will know and the enemy will know can do the job for which they are designed if they are called on for that purpose.

Let me turn for a few minutes to the treaty itself that we have proposed. There has been a bit written about it as being very comprehensive, very inclusive, and in fact, it is.

This treaty, as we have drafted it and presented it, is probably one of the most comprehensive arms control documents from the standpoint of verification and compliance that we have ever presented and certainly it is the most comprehensive of any that have been proposed to deal with chemical weapons.

You might ask rightly how does it differ? Well, it differs in one very significant way. If you look at the text of previous treaties, especially the 1925 Geneva Protocol which we consider generally the world operates under today, it is basically a statement of intent, a pledge, if you will, for a nation simply to say that it won't use chemical weapons.

It is interesting to note that Iran and Iraq are parties to the 1925 Geneva Protocol. That Protocol did absolutely nothing to eliminate chemical weapons or the facilities in which they might be manufactured or stored.

It did nothing to keep them off the battlefield. In fact, the treaty, although it was a statement of purpose that we all heartily endorsed, really failed in its ultimate objective by not providing the tools and the mechanism and the international lever necessary to prevent those weapons from ever being used, but more importantly to prevent them from ever being manufactured in the first place.

We attempt to address those problems in our draft treaty. There are three areas in particular that the treaty addresses.

One is storage of chemical munitions and their destruction. We would set up a regime whereby the United States and Soviet Union and other nations as well who would sign the treaty would not only engage in a systematic and orderly destruction of those stored chemical weapons, but would also agree to open international on-site inspection which we believe is absolutely critical.

In simple language that means international observers, accredited for the purpose and properly trained, would visit the destruction facilities wherever they exist in the United States and Soviet Union and other nations as well so that they could calibrate the instrumentation and certify that in fact the provisions of the treaty were being complied with.

The second aspect is the identification and destruction of facilities in which chemical weapons are being manufactured. These are primarily military facilities, but not necessarily exclusively so.

The same principle applies. It is necessary to identify the facilities in which chemical weapons are manufactured and it is important to certify that the destruction is not only cosmetic so that the facility could be reassembled erector set style in a few weeks, but to certify in fact that the facility has been destroyed in such a way that it could not produce militarily viable chemical munitions for military purposes.

That is a matter not only for photography or instrumentation, but we believe also a matter for accredited on-site inspectors who are trained to watch the destruction and elimination of these facilities.

The third area is probably the most complex and certainly one of the most important. That addresses the possibility that clandestine facilities may exist or that U.S. observers and Soviet observers or observers from other nations may identify storage areas or chemical facilities here and there that they suspect might be used in the production of what would be a illegal chemical munitions.

We have devised what we have called a challenge inspection provision or "open invitation" provision that would obligate any signatory nation to open its facilities to the observers to determine whether a chemical factory is manufacturing insecticides or other materials that are totally unrelated to chemical munitions or whether in fact chemical munitions are being manufactured.

I must say we operate under no illusions that this provision is going to be easy to agree upon in Geneva. We know that there are differences of opinion in the Soviet Union and other nations as to how this is best implemented, but I think any objective and sophisticated look at the problem would indicate that it is not merely sufficient to destroy existing stockpiles or known manufacturing facilities, but we also must raise our level of confidence that in fact chemical munitions might not be manufactured or be stored that could be brought onto the battlefield at some critical juncture during rising tensions or during a critical point in the battle in total violation of the principle of the agreement.

We are hopeful that a provision adequate to that very difficult task can be negotiated and one that will reflect the direction and intent of the provisions that we have drafted in our treaty.

The next question obviouisly is: How does the rest of the world review those treaty provisions and most importantly, is it saleable to the Soviet Union?

We believe the job can be done. In fact, we have been somewhat encouraged by the Soviet attitude toward on-site verification in the first instance. That is destruction of current stockpiles.

The Soviets have indicated some forthcomingness in accepting the on-site inspection provision. We consider that a very good sign and a very helpful sign.

However, that in itself does not conclude the negotiations: far from it. We must address the second and third points. We must have a high level of confidence that not only the stockpiles have been identified, but the manufacturing facilities have been identified and destroyed.

We have to address the possibility of clandestine resources. Those two provisions are going to take some work, but we are very confident that with diligence and with what we perceive to be a very high level of support in principle throughout the world that such a treaty can be drafted and that when it is drafted it will be adequate to the job of reducing the prospects of chemcial weapons use and chemical weapons manufacture throughout the world.

Let me conclude by making a few observations. I know that there has been some speculation about why this treaty at this time.

I think that when you read the horrible reports of chemical weapons use in the Middle East, when you see the medical descriptions of the terrible blisters and sores and damage to lungs and disfigurement that has occurred, even in that rather isolated war, one can only imagine the horror of chemical weapons use if it should occur in Europe, if it should occur in any other part of the world where conflict may arise.

That in itself is enough of an impetus for any thinking person, in my opinion, to do what he or she can as earnestly and diligently as possible to try to raise that threshold of danger to the point where chemical weapons will not only not be used, but where they will be mutually banned by the nations that currently have them or nations that may aspire to have them in the future.

We are not going into this exercise blindly with the thought that this goal will be easy to accomplish, but as one who has been in Geneva and who has talked to many of those who will be negotiating this treaty in that multilateral forum, I can report to you very earnestly there is a very high degree of interest in what we are proposing.

Disagreement and suggestion and alternatives aside, there is a very high degree of concern for the spread of chemical weapons and the possibility of their use.

I think it is absolutely the proper time for us to move ahead and try to capitalize on the spirit of concern and at the same time to try to build a treaty that will not merely be a cosmetic answer to a visible problem, but in fact will demonstrate that it has substance and it has sustaining power to address itself to the fundamental question of verification which will easily make the difference between success and failure.

Gentlemen, I will be very happy to answer any questions that you might have.

[The prepared statement of Mr. Emery follows:]

Prepared Testimony of David F. Emery, Deputy Director, U.S. Arms Control and Disarmament Agency

Mr. Chairman, it is a pleasure to be here today to discuss with the committee the administration's position on chemical weapons arms control and our recent initiative in Geneva at the Conference on Disarmament. I first plan to discuss with you today the grim history of chemical weapons, their blatant use in recent years in violation of existing international agreements and the steps which led to the Vice President's presentation of the United States Draft Convention to ban chemical weapons.

Let me define chemical weapons in the context of the United States Draft Convention. Chemical weapons are:

"Super-toxic lethal, other lethal, and other harmful chemicals, and their precursors, except for those chemicals intended solely for permitted purposes as long as the types and quantities involved are consistent with such purposes and except for those chemicals which are not super-toxic lethal, or other lethal, chemicals and which are used by a party for domestic law-enforcement and riot control purposes or used as a herbicide; or

"Munitions or devices specifically designed to cause death or other harm through the toxic properties of any chemical which is defined as a chemical weapon and which would be released as a result of the employment of such munitions and devices; or

"Any equipment or chemical specifically designed for use directly in connection with the employment of such munitions or devices"

Such weapons are unique among modern battlefield means of destruction in that their principal targets are human beings– additionally they can deprive, through persistent contamination the use of weapons, equipment or structures and severely degrade military unit effectiveness through the threat of casualties. Chemical weapons are singularly repugnant to civilized states and individuals because of their capacity to cause an indiscriminate and agonizing death to both combatants and noncombatants with equal effectiveness.

For nearly as long as chemical weapons have been part of the world's arsenals, civilized men and women have sought to control or even eliminate these weapons. A short history of chemical weapons use and arms control will serve to illustrate the futility of most attempts to control these horrid weapons, and at the same time, inspire us to try harder in the months and years ahead.

In 1899, at the invitation of Tsar Nicholas II, international peace conferences met at the Hague to discuss arms limitation and peaceful settlement of international disputes. The results were the Hague Conventions of 1899 and 1907. Article 23 of these conventions bound the signatories:

"To abstain from the use of projectiles the sole object of which is the diffusion of asphyxiating or deleterious gases."

The United States questioned the effectiveness of such agreements in wartime, and, as a result, declined to sign the 1899 convention. Or worst fears were realized with the onslaught of World War I and the first, large-scale battlefield CW use. In World War I on several occasions during the first phase of that war, tear gas was employed by both sides. Then, in April 1915, the Germans launched a chlorine gas attack at Ypres, Belgium causing some 5,000 deaths among 15,000 to 20,000 allied casualties. Six months later the British retaliated.

In December 1915, the Germans struck again, this time with phosgene, a choking gas capable of penetrating the protective masks then being used by Allies. Even after the masks had been improved, the Germans used vomit gas in order to force soldiers to remove their masks and expose their lungs to phosgene. The French and Austrians initiated the use of blood gases in 1916, and Germany introduced mustard gas—which blisters the skin on contact—in July 1917, 3 months after United States entry into the war. By the end of World War I, chemical weapons comprised more than 20 percent of the artillery munitions used, and were responsible for 90,000 deaths and 1.2 million casualties among the 7 countries in the war.

The horror of WWI convinced the Allies to reaffirm the Versailles Treaty of 1919 the prewar Hague prohibition of the use of poisonous gases. The provisions of the peace treaty with respect to chemical warfare were intended to deny the Germans similar advantages in the future. Part V, section I, chapter I, article 171, of the Treaty of Versailles states:

"The use of asphyxiating, poisonous or other gases and all analogous liquids, materials or devices being prohibited, their manufacture and importation are strictly forbidden to Germany.

"The same applies to materials specially intended for the manufacture, storage and use of the said products or devices. . ."

Drawing upon the language of the Versailles Peace Treaty, the United States took the initiative of introducing a similar provision—at the Washington Arms Conference of 1922—into a treaty on submarines and noxious gases:

"The use in war of asphxyiating, poisonous or other gases and all analogous liquids, materials or devices, have been justly condemned by the general opinion of the civilized world and a prohibition of such use having been declared in treaties to which a majority of the civilized are parties:

"Now to the end that this prohibition shall be universally accepted as a part of international law binding alike the conscience and practice of nations, the signatory powers declare their assent to such prohibition, agree to be bound thereby between themselves and invite all other civilized nations to adhere thereto."

This resolution was accepted verbatim. Although ratified without difficulty in the United States, the treaty never entered into force. The French declined to ratify the treaty, citing their objections to the submarine provisions.

The next international effort to control chemical weapons through arms control took place at the Geneva Conference of 1925. Initially, the Conference was not intended to consider the issue of poison gas. As the formal title of the Conference implied—"Conference for the Control of the International Trade in Arms, Munitions and Implements of War"—the Conference convened under the aegis of the League of Nations to restrict, if not abolish, the private arms trade thought by many to be one of the causes of World War I. Once again, the United States took the initiative by presenting an amendment prohibiting the export of gases for use in war.

At France's suggestion, the Conference decided to draft a protocol on the nonuse of poisonous gas; and at the suggestion of Poland, this prohibition was revised to include bacteriological weapons. The result was the Geneva Protocol of 1925 prohibiting the use in war or asphyxiating, poisonous or other gases, and of bacteriological methods of warfare. The text of this protocol states:

"Whereas the use in war of asphyxiating, poisonous or other gases, and of all analogous liquids, materials or devices, has been justly condemned by the general opinion of the civilized world; and

"Whereas the prohibition of such use has been declared in treaties to which the majority of powers of the world are parties; and

"To the end that this prohibition shall be universally accepted as a part of international law, binding alike the conscience and practice of nations; declare:

"That the high contracting parties, so far as they are not already parties to treaties prohibiting such use accept this prohibition, agree to extend this prohibition to use of bacteriological methods of warfare and agree to be bound as between themselves according to the terms of this declaration."

The 1925 Protocol does not prohibit production or possession of chemical, weapons, nor does it contain verification provisions to ensure that parties are in compliance. These shortcomings are presently being illustrated in several areas in Asia.

Other postwar treaties gained their binding force through reference to the Hague conventions. The Geneva Protocol stood alone, without resort to interpretation of the Hague precedent.

The next major initiatives for dealing with gas warfare were the 1932-37 sessions of the World Disarmament Conference. Although unsuccessful, attempts were made to work out an agreement that would prohibit the actual production and stockpiling of chemical weapons. It should be noted that in 1936, during these sessions, Nazis developed the nerve agent tabun, which has recently been used by Iraq in its war with Iran.

Although Italy was a party to the Geneva Protocol, it used poison gas in Ethiopia during the period 1935 to 1936. It has been estimated that 15,000 out of a total of 50,000 Ethiopian Army casualties were caused by Italian use of chemical weapons.

During World War II, new and more toxic nerve gases were developed. On June 8, 1943, President Roosevelt warned the Axis powers against the use of chemical weapons. President Roosevelt said:

"Use of such weapons has been outlawed by the general opinion of civilized mankind. This country has not used them, and I hope we never will be compelled to use them. I state categorically that we shall under no circumstances resort to the use of such weapons unless they are first used by our enemies."

And he promised:

"Full and swift retaliations in kind . . . throughout the whole extent of the territory of such Axis country."

In the postwar negotiations on general disarmament, chemical weapons were usually considered together with nuclear and conventional weapons. In the 1962 sessions of the 18-nation disarmament committee, both the United States and the Soviet Union offered proposals for general and complete disarmament that included provisions for eliminating chemical weapons.

In 1966, the United States joined by Canada, Italy, and the United Kingdom, introduced amendments to a Hungarian resolution that would have made the use of any chemical or bacteriological weapons an international crime. In its final form, the resolution called for "strict observance by all states of the principles and objectives" of the Geneva Protocol, condemned "all actions contrary to those objectives," and invited all states to accede to the protocol.

Shortly after President Nixon took office in 1969, he ordered a review of U.S. chemical warfare policy and capabilities. On November 25, 1969 the President reaffirmed that the United States would not be the first to use lethal or incapacitating chemical agents and weapons and unilaterally renounced the use of biological weapons under any circumstances. On February 14, 1970, the White House announced extension of the ban on biological weapons use to cover toxins as well (substances falling between biologicals and chemicals in that they act like chemicals but are ordinarily produced by biological or microbic processes) and the Defense Department drew up a plan to destroy existing stocks.

Following the 1969 and 1970 action by the Nixon administration, on January 22, 1975, President Ford signed the instrument of ratification for the 1972 Biological and Toxin Weapons Convention.

Under the terms of the Convention, the parties agreed not to develop, produce, stockpile, or acquire toxins "of types and in quantities that have no justification for prophylactic, protective and other peaceful purposes," as well as weapons and means of delivery. Nothing in the Convention was to be interpreted as loosening the obligations imposed by the Geneva Protocol. Both the United States and Soviet Union are parties to this treaty as are Afghanistan, Laos, and Vietnam.

In the mid-1970's, reports began reaching the West from Laos on chemical attacks against Hmong villages and guerrilla strongholds. Hmong refugees gave details of attacks by toxic agents and exhibited severe medical symptoms. They brought with them samples of the agent dropped by aircraft and helicopters on their villages and crops. Analysis of these samples by qualified scientists in the United States and other countries revealed that they contained trichothecene toxins, which cause vomiting, bleeding, blistering, severe skin lesions and other symptons. These experts have concluded that the Hmong were exposed to a toxic agent and that no naturally occurring disease, plant or animal could have caused these physical effects.

In 1978 there were confirmed reports of Vietnamese use of toxins in Kampuchea. Analysis of blood, tissue, urine, and other samples from victims of attacks from both Laos and Kampuchea has been performed in a number countries and concluded that illness had been caused by toxin agents. Chemical warfare has continued in Kampuchea and Laos through 1983.

Reports that the Soviet used chemical agents for 3 years following their 1979 invasion of Afghanistan were confirmed by scientific evidence and corroborated by testimony from Soviet and Afghan personnel directly involved in the chemical attacks.

In 1982, the U.S. Government issued two reports summarizing its analysis of chemical and toxin weapons in Laos, Kampuchea, and Afghanistan. The reports coucluded that:

Lao and Vietnamese forces, operating under Soviet supervision, have, since 1976, employed lethal chemical and toxin weapons in Laos.

Vietnamese forces have, since 1978, used lethal chemical and toxin agents in Kampuchea.

Soviet forces since 1979 have used a variety of lethal chemical warfare agents, including nerve agents and toxins, in Afghanistan.

The evidence for these conclusions includes: Testimony of those who suffered chemical weapons attacks; testimony of doctors and others who questioned the victims of chemical warfare; testimony of those who engaged in chemical warfare or were in a position to observe others who had done so; scientific evidence; and intelligence derived from "national technical means," and other intelligence means. Other countries have assembled similar evidence through their own investigations.

In 1982, the UN investigated reports of chemical weapons use in these areas and found evidence that chemical agents had indeed been used. In addition, Thailand and Canada have made their evidence and conclusions a matter of public record, while still others have publicly agreed with these conclusions.

In a February 1984 report to the UN, the United States noted an apparent decline in 1983 in the use of toxic agents in Laos with indications that less lethal agents were being used. In Kampuchea, while the level of use of toxic agents remained essentially the same as in 1982, nonlethal incapacitating or riot-control agents were used more frequently than lethal or more toxic agents. In Afghanistan, chemical attacks were reported to have occurred in 1983, but these reports could not be confirmed.

The Soviet's total disregard for complying with the provisions of the 1925 Geneva Protocol and the 1972 Biological and Toxin Weapons Convention was a major finding in the 1984 President's report to the Congress on Soviet noncompliance with arms control agreements. Specifically, this report stated:

"The Soviets, by maintaining an offensive biological warfare program and capabilities and through their involvement in the production, transfer and use of toxins and other lethal chemical warfare agents that have been used in Laos, Kampuchea and Afghanistan, have repeatedly violated their legal obligations under the BWC and customary international law as codified in the 1925 Geneva Protocol."

The world is now witnessing yet another blatant use of chemical weapons. Since 1983 Iraq has been using lethal chemical weapons against Iran. I want to emphasize that both Iraq and Iran are parties to the 1925 Geneva Protocol, which prohibits the use in war of chemical weapons. In March 1984 the UN investigated charges of Iraqi chemical weapons use and reported that both mustard gas and the nerve agent tabun have been used against Iranian forces. The United States has confirmed these reports and recently placed special export controls on selected chemicals while strongly encouraging its allies to do likewise.

President Reagan himself called world attention to the use of chemical weapons in Afghanistan and Southeast Asia. In his speech to the second special session on disarmament in June 1982, he stated:

"The use of chemical and biological weapons has long been viewed with revulsion by civilized nations. No peacemaking institution can ignore the use of these dread weapons and still live up to its mission. The need for a truly effective and verifiable chemical weapons agreement has been highlighted by recent events. The Soviet Union and their allies are violating the Geneva Protocol of 1925, related rules of international law and the 1972 Biological Weapon Convention. There is conclusive evidence that the Soviet Government has provided toxins for use in Laos and Kampuchea, and are themselves using chemical weapons against freedom fighters in Afghanistan."

This statement was the first of a series of events which culminated in the Vice President's presentation this year of a Draft Convention to ban chemical weapons to the 40-nation Conference on Disarmament in Geneva.

This marked the Vice President's second appearance before the Conference.

His first visit was in February 1983, when he announced that the United States would like to see the work of the committee accelerated, and negotiations undertaken on a treaty to eliminate the threat posed by chemical weapons.

In his 1983 speech the vice president set the stage for the standard of verification the United States would expect in a treaty to ban chemical weapons:

"The key to an effective convention—one that could eliminate the possibility of chemical warfare forever—is the firm assurance of compliance through effective verification. This principle is fundamental. Effective verification, as the world's recent experience with the use of chemical and toxic weapons shows, is an absolute necessity for any future agreement. This is why the United States seeks a level of verification that will protect us, our allies, and indeed humanity itself. For today, the threat of chemical warfare has increased. And until an effective agreement can be achieved, the United States, just as others, must continue to ensure that it can deter the use of chemical weapons against its citizens and friends. If we are to expect nations ever to forgo the ability to deter chemical warfare, those nations must have confidence that others who accept the prohibition cannot circumvent their obligations and later threaten the peace with chemical weapons. They must be certain that they will not be attacked with such weapons by any state which, like they, has foresworn chemical warfare. In short, for us, the verification and compliance provisions of a comprehensive chemical weapons treaty must be truly effective."

In conjunction with the Vice President's 1983 visit, the United States provided to the conference a paper outlining its detailed views of the requirements of an effective chemical weapons ban, including systematic onsite inspection of chemical weapons stocks and production and filling facilities. In fact, our draft treaty text is modeled after the detailed views paper.

In November 1983, the United States sponsored a 2-day workshop in Salt Lake City and at the Tooele Army Depot for member and observer nations of the conference to demonstrate potential onsite verification procedures for the destruction of chemical weapons. Of the Soviet and Eastern European countries, only Romania accepted the invitation to attend the Tooele Workshop.

In January 1984, Secretary of State George Shultz announced to the opening session of the conference on confidence and security building measures in Stockholm that, the United States would be presenting a draft treaty text to ban chemical weapons at the Conference on Disarmament in Geneva.

And on April 18, the Vice President presented the Draft Treaty to the 40-nation Conference on Disarmament. In doing so he told the conference that:

"For a chemical weapons ban to work, each party must have confidence that the other parties are abiding by it. This elementary, commonsense principle is the essence of what we mean by verification. No sensible government enters into those international contracts known as treaties unless it can ascertain—that it is getting what it contracted for."

The treaty proposed by the United States includes unprecedented verification and compliance features. These features are essential to assure verification and are not, as the Soviets have charged, part of a propaganda effort. The treaty would prohibit development, production, possession, transfer and use of chemical weapons. The design of a verification regime to ensure that commitments in an arms control treaty will be honored is especially difficult to structure for a chemical weapons ban. After much careful deliberation, we decided that a new and unprecedented openness is required by all nations to make a ban on these weapons effective. This was a hard choice. However, we are confident, after weighing the issue and assessing both the difficulties and the benefits of an effective ban, that others including the Soviet Union will share this conclusion.

Verification measures would include a system of regular international onsite inspections for verifying declarations, monitoring stocks and facilities prior to destruction, confirming destruction, and monitoring permitted activities such as commercial production of specified chemicals which might pose a particular risk. A special mechanism, involving challenge onsite inspection, anytime, anywhere, for military and government-owned or controlled facilities would be established to deal with suspected violations.

Mr. Chairman, these verification provisions are tough, but they must be tough in order to achieve the highest degree of confidence possible. Please note that we are talking about the highest degree of confidence possible because a 100-percent verifiable agreement can probably never be achieved. We must, as Vice President Bush said, be able to verify that we are getting what we contract for.

Let the world harbor no doubt that the United States is serious about this proposed ban. We have watched for many years as the 1925 Geneva Protocol and the 1972 Biological and Toxin Weapons Convention were repeatedly violated because these agreements lack effective verification and compliance provisions.

The United States has demonstrated restraint in the production of chemical weapons for 15 years. However, U.S. restraint has failed to induce recipriocal Soviet restraint.

Soviet armed forces have enjoyed extensive modernization and growth in all areas of chemical capabilities. The Soviet Union continues to test, produce and stockpile chemical weapons. Moreover, the Soviets have in place the doctrine, plans, personnel and equipment to support the widespread use of chemical weapons and frequently test these in major military exercises on the battlefield. Many analysts believe that this expansion of chemical warfare capability gives the Soviets a significant military advantage when used in a conventional conflict. The continued testing of chemical weapons at expanded test facilities, enlarged storage capacity for chemical agents and weapons, and the existence of active production facilities are among the indicators of unabated Soviet chemical weapons activities. These factors, along with the evidence of the use of chemical and toxin weapons by the Soviets and their clients in Afghanistan, Laos, and Kampuchea, unquestionably reflect a drive to strengthen and improve their ability to wage chemical warfare. There is no other plausible explanation.

Today, due to the condition of our chemical munitions stockpile, we can no longer deny a significant advantage to the Soviets should they initiate chemical warfare. This asymmetry is militarily dangerous and undermines deterrence of the use of chemical weapons. In the absence of a verifiable comprehensive ban, a credible military chemical deterrent is necessary to support our efforts to improve conventional forces and reduce our dependence on nuclear deterrence.

Given the great asymmetry in chemical warfare capabilities, it remains to be seen how serious the Soviets will be about negotiating for an effective, comprehensive ban on chemical weapons. At the same time having modern chemical weapons to replace the aging munitions in the stockpile would provide the United States with a credible chemical weapons deterrent and provide the Soviets with an incentive to negotiate a ban.

Mr. Chairman, this is an appropriate point for me to quote Under Secretary Eagleburger from over a year ago:

"We have all heard the charges that the continuing Soviet defiance of international norms through the use of chemical and toxin weapons proves that arms control cannot work. Further, if the Soviets would so blatantly violate two important international treaties, what will keep them from violating other arms control agreements as well? We would contend that Soviet actions lead to a different conclusion—real, equitable, and fully verifiable arms control is an absolute necessity. It is not that arms control is pointless; it is that we have to do a better job of it."

Mr. Chairman, our goal is the total elimination of chemical weapons and I pledge that the Arms Control and Disarmament Agency will continue to work diligently and expeditiously to achieve this goal. We look forward to your advice and support as we pursue these negotiations.

I would be happy at this time to respond to any questions that the committee might have.

Senator **Quayle**. Let us hear from General Kroesen.

General **Kroesen**. Sir, I have no unclassified remarks to make. I would prefer to wait until we go into closed session.

Senator **Quayle**. What we would like to do is get as much testimony out in the open as possible. If you do not want to give a statement, that is fine.

We will get into questions. I have a question for General Kroesen. I am sure other Senators will too. Please don't feel reluctant to ask questions.

Senator Warner?

Senator **Warner**. First, I want to congratulate former Congressman Emery for your very articulate and comprehensive explanation of this initiative by the United States.

I looked the draft treaty over and read its coverage and it was received, I think, in the Committee on Disarmament with considerable enthusiasm. The Soviets expressed their concerns, but I thought in a more moderate fashion than I had anticipated.

I believe it was the Vice President's skill in handling that and also his personal relationship, I understand, and long association with the Soviet representative in the Committee on Disarmament.

I am not correct?

Mr. **Emery**. You are correct. As a matter of fact, Vice President Bush had known Ambassador Israelyan from the days in New York at the United Nations. In fact, we were very pleasantly surprised at what appeared to be a moderate statement from the Soviets.

I think we had expected a bit more of a diatribe, maybe some very harsh words for the initiative, but in fact, Ambassador Israelyan addressed some of the elements of the verification package where we disagreed, but did so in a nonpolemical fashion and without trying to read too much into that, we thought that was a very constructive approach.

It, in fact, added to the rather positive tone of the Vice President's presentation.

Dr. **Gold**. That was different from the response that Vice President Bush got in February 1983 when you recall he went and reaffirmed U.S. commitment to the treaty and that was the occasion of our submitting our "detailed views" paper.

At that time Ambassador Israelyan gave a very harsh and not very constructive response to Vice President Bush's speech.

Senator **Warner**. Let us hope for the best. We have taken a bold initiative on one of the tracks.

VERIFICATION

Back to the practical question of verification. The issue has been raised that perhaps one manufacturing facility could be engaged in producing certain chemical elements which have peaceful applications, nonmilitary, and at a geographic location quite remote, maybe 500 or 1,000 miles away is a second plant making a different set of chemical compositions, but again ones that have peaceful applications, and then if the Soviets or any other nation to this treaty chose to have a breakout formula, suddenly they only need to transport and bring two ingredients together and have some means by which to encase them and then they have the weapon.

How do we overcome that?

Perhaps Dr. Gold and Dr. Wagner can join in this.

Is that an insurmountable problem in this arms control area?

Mr. EMERY. Senator, we don't think it is an insurmountable problem, but it is certainly a problem. I think it is only candid to say that we don't anticipate that it is possible to verify that aspect of the treaty to a 100 percent certainty, but we can certainly cut the odds down considerably from what they are today.

There are also a variety of other questions as well that I think focus on that very point.

It is one thing to manufacture certain chemicals that may have a military application, but it is another thing to manufacture them in quantities that are militarily significant.

It is another thing to bring them together in a munitions plant and to store them in an area which is militarily convenient or has the proper guard or safeguard, whatever, without drawing an amount of attention if the attempt is to escape observation.

What I am saying is that we believe there is a very high likelihood that in most cases, I would not claim all, but in most cases, we would identify certain activities which would make us suspicious and if the challenge inspection provision, the open invitation provision, is included in the final draft of the treaty and if in fact it works as we intend it to work, we believe we will be able to identify these suspicious areas with a rather high degree of success and in fact just take a quick look at them within 24 or 48 hours as the treaty provides.

So, even if we couldn't guarantee perfect compliance, which, quite frankly, is going to be extremely difficult, if not impossible to do, we think we can cut the odds down to the point where it would simply not be feasible for the Soviet Union or any other nation to rely on chemical munitions to any great extent because it would simply be too easy to be caught.

CHEMICAL WEAPONS

Senator WARNER. General Kroesen, as a student of military history and one who served this Nation with great distinction at all levels of command, do you concur in the theoretical conclusion that the German Army did not employ the use of chemical weapons during World War II for the reasons that the allies had equal retaliatory capability?

General KROESEN. Sir, I concur that initially the deterrent effect of the allied chemical capability kept the Germans from employing chemicals. I believe in the latter stages of the war it is like any function which falls into disuse, it atrophies.

I don't know for sure that the Germans in 1945 had a chemical capability that would have been significant had they chosen to employ it. That may have been an equal reason that they did not resort to it in those last desperate days when it seems to me Adolf Hitler was willing to try anything.

Senator **Warner**. General Klein, do you have observations on that point?

General **Klein**. I think I would agree with General Kroesen, sir. I certainly would underscore that by the United States and the allies having a deterrent capability, retaliatory capability, that it was an effective deterrent.

Senator **Warner**. Thank you very much, Mr. Chairman.

Senator **Quayle**. Senator Exon?

Senator **Exon**. Mr. Chairman, thank you very much.

Let me start out, if I might, with Mr. Emery.

Mr. Emery, I am one of those who have generally supported the modernization of our chemical weapons. I have voted for such a modernization on many occasions. I am very pleased to see the administration make the move that they have.

CHEMICAL WEAPON ONSITE INSPECTION

As a member of the Disarmament Agency, how do you explain and how do we explain to the Soviet Union that we now want to go into essentially onsite inspection for chemical weaponry in both countries while at the same time the administration is holding back on even beginning negotiations with the Soviet Union as far as space weaponry is concerned?

It seems to me those are two diametrically opposed positions. If I were the Soviet Union, I would be asking you why you want to get together on chemical weaponry but now you refuse to begin talks on space weaponry.

Mr. **Emery**. Let me answer it by saying those are two very different issues.

Senator **Exon**. I appreciate that. Do they both come under your direction, the Agency you are associated with?

Mr. **Emery**. They certainly do. I should tell you that the Arms Control and Disarmament Agency has been spending a tremendous amount of time and a great deal of effort in analyzing various possibilities for space arms control.

Even though no conclusion has been drawn as to what initiatives, if any, the administration may choose to put forward, it is certainly not correct to say that we are not analyzing those possibilities very diligently, and we are.

Senator **Exon**. Let me interrupt you.

The story on the front page of the Washington Post this morning is not an accurate reflection of the administration's position?

Mr. **Emery**. Senator, I did not see the Washington Post this morning, but I can only tell you—that might mean that it was a dead issue, I guess. I did not see the newspaper this morning for reasons that I have to take up with the Post itself. In fact, if anyone in the back row has a copy.

At any rate, let me state, not having read the article, that there are many differences of opinion within the administration as to what ought to be done and the Arms Control Agency is following its guidance and its direction, analyzing all those possibilities.

If and when we can resolve some fundamental questions that are of great concern to us about verification, if we can resolve problems with our interpretation of what we see as in our best interest and what the Soviets see in their best interests, we can put a proposal on the table, but we are not going to do that until we are sure that we know exactly the direction in which we feel we should go.

Verification problems with antisatellite technology, for example, are extraordinarily difficult. They are as difficult in their own way, and maybe more difficult, than those that we face with chemical weapons.

We have the possibility of onsite inspection with chemical weapons, at least for stockpile destruction, but the design of many Asat systems, including the one that the Soviets have deployed now and the one we are designing, are such that they are easily concealed and we would have to be very certain that they weren't being manufactured and ready for utilization in a very short period of time.

There is no sense to sign a treaty that is not verifiable because it will give a false sense of security and maybe a false sense of accomplishment until the balloon goes up, and that is what we are concerned about.

Senator EXON. Mr. Secretary, let me interrupt you.

What you have just said is rhetoric that we hear all the time. I think those of us here understand that full well. There is no use in getting into a treaty that we cannot verify.

That does not mean, does it, that we should not try to do as you are doing now with the chemical weapons offer that you have made?

It would seem to me that a simultaneous offer along the same line could be made on other types of weaponry.

I am talking about Star Wars and the main thrust of the Post article this morning was about Star Wars.

I think it is very important, it is critically important, that we make a determination of the difference between Asat and Star Wars.

They are basically two different concepts. I am simply saying that those of us who have supported all these programs, including the chairman of this subcommittee and myself, who spoke out in support of the recent report from the White House in this regard, have some reservations that we have to keep pressing for negotiations in that area as well.

My point is that I am fearful that the Soviets may discount your good efforts in chemical warfare by saying they are not sincere because they want to go into arrangements here, but they ignore and shun aside any effort toward some kind of understanding on more sophisticated weaponry.

Are you concerned that the Soviets might take that position?

Mr. EMERY. I am sure that the Soviets might be inclined to say that, Senator, but nevertheless if they are serious about chemical weapons and they are confronted with the negotiations in Geneva, one would hope they would negotiate in good faith and work on the space-related activities or others, in the appropriate forum at an appropriate time for them.

I don't see a linkage between one and the other. It seems to me we have to do all we can to identify what is in our interest and, if possible, to draft an agreement or a treaty that addresses itself to the space issues that you quite properly raise.

That is another issue for another time, but one we certainly ought to look at and we are looking at it. We are examining all the possibilities. But we have to come to a point in our deliberations where we are ready to draft a proposal and present it, but we simply haven't completed our work yet.

There is no sense to go into a great deal of detail on Star Wars or SDI or Asat at this time. I am sure there will be other opportunities to do that in a a more comprehensive fashion.

Let me say that the whole SDI Initiative is designed to determine what is feasible and what is not feasible and determine what can be developed and what can't be. It is part of the very effort to determine what the possibilities are and until we have answers to those questions, which is quite properly the realm of this committee and any member to question and participate in, we will not be able to draft a treaty because we will not only not know what the possibilities are for ourselves, but we also won't know that the Soviets will be able to do as well and that certainly is a very important part of the question.

Senator EXON. Mr. Chairman, I would like to address this question to General Kroesen.

CRUISE MISSILES

I will be looking forward to your closed testimony, but maybe you can handle this in open session.

The Netherlands, as I understand it, is the only nation where we are planning to base cruise missiles which has not formally accepted and committed itself to such a deployment.

You are familiar, I think, with the fact that we have now seen some public opinion polls which indicate that a substantial majority of the Dutch people oppose the deployment of the cruise missiles. As I understand it, in the next 45 days or so a vote will be taken on this in the Dutch Parliament.

What do you feel would be the political and military consequences if the Netherlands did not agree to the deployment of the cruise missiles?

General KROESEN. Senator, I am not sure that I can envision the consequences of such a decision. I believe that it is a very serious matter in the NATO arena. I believe that the great NATO strength has been the unanimity with which the NATO nations have acted in the past when their defenses were threatened.

If the determination by the Dutch is not to accept cruise missiles, if that is in fact the decision, I believe it will undermine the military forces understanding that all nations are committed to the agreement that an attack on one is an attack on all and that they all bear an equal responsibility for being able to respond to that attack.

Senator EXON. I would certainly agree with you.

My concern would be that if the Dutch do not make the commitment that we expect them to make, this would have an effect on the commitments that have been made by other members of NATO? Do you share this concern?

General **Kroesen**. I can only say, sir, that I would anticipate a lot of reappraisals by those nations about what their commitment really is and what their collective responsibilities are.

General **Exon**. Thank you, General.

Thank you, Mr. Chairman.

ARMS CONTROL WITHOUT ONSITE INSPECTION

Senator **Quayle**. Mr. Emery, in your outline of the three major efforts in arms control, the first one was to identify stockpiles and I think production, get an exchange of information with the Soviet Union on where they are and to be able to verify that.

Obviously if it is an onsite inspection, that is the easiest, but perhaps that is down the road.

I wonder on the verification issue, since the verification, particularly in times of total ban, is going to be exceedingly difficult, particularly considering what Senator Warner was talking about, they have different facilities and you talked about clandestine operations as the third item in your proposed disarmament negotiations, what have you been doing to increase our capability in research and analysis and collection of verification data in relation to chemical warfare?

Are you making additional efforts, additional requests to beef up your capabilities in ACDA?

Mr. **Emery**. There have been a variety of initiatives, not specifically from ACDA, but in cooperation with the Department of Defense as well.

Probably Dr. Gold and Dr. Wagner can address that. But that is a very important aspect.

However, I must say that the conclusion that we come to is that there are only limited means to identify the presence of chemical agents if you are in fact not on the ground near the facility.

For example, from a satellite you can certainly take a picture of a facility, you can see railroad cars and powerlines and smokestacks and things of that nature.

Senator **Quayle**. Would you be able to conclude a treaty if we don't have an onsite inspection?

Mr. **Emery**. It would be very difficult.

Senator **Quayle**. You are basically saying onsite inspection is absolutely imperative?

Mr. **Emery**. It is critical.

Senator **Quayle**. There is no other way to get verification?

Mr. **Emery**. Sir, there is no way you can verify a chemical treaty by remote control.

It will require people and instrumentation on the ground for several reasons.

One, so that you can see what is going on.

Second, so that you know your instrumentation is not being tampered with.

Dr. **Gold**. During the closed session we can show you some pictures of things going on.

Senator **Warner**. By remote control, you meant to use the national technical means as a general definition?

Mr. **Emery**. That is correct.

Senator **Quayle**. Let me ask this. Can we have an exchange of information with the Soviet Union on where the current stockpiles are, the current production facilities, without onsite inspection?

Would we have ways to verify what they are telling us, that there is complete truth, and be able to move forward on that aspect of arms control without the onsite inspection?

I am for the onsite inspection, but it is a fairly sensitive issue.

Dr. **Gold**. Onsite inspection is essential. An exchange of information you are talking about would be a valuable input to our pool of knowledge and perhaps an interesting first step, but by itself it would not validate anything.

Mr. **Emery**. The bottom line is that you would obviously take the information presented by the Soviet Union and then apply your national technical means to whatever extent you could.

You could photograph the facilities that they pointed out. You could learn from that because you could learn what to look for in other places they do not tell you about, but it would not tell you what is going on under the roof.

That is why you need the onsite inspection team. You might verify what they showed you, but you could not verify what they did not show you somewhere else.

We have the ability to challenge and inspect in order to satisfy ourselves where they have shown us the facilities.

SOVIET CAPABILITY TO WAGE CHEMICAL WARFARE

Senator **Quayle**. How comfortable are you in making a general assessment of whether the Soviets or other countries are capable of waging chemical warfare?

Mr. **Emery**. Sir, that gets into an area that probably ought to be discussed in closed session.

Senator **Quayle**. Can you give us a general description for public consumption?

I am not asking for sensitive data, but just a general feeling for this issue.

How comfortable are you? Do we know? Is it a reasonable feeling of confidence? It is unreasonable?

Mr. **Emery**. It is very reasonable. We have from a variety of sources a very substantial idea of what facilities exist and where they exist.

Of course, if we are talking about Western nations or nations that at least are not totally closed to travel and to openness and to discussion, we have a very, very good idea.

Dr. **Gold**. It depends on what question you are asking to say whether it is comfortable or not.

We are comfortable in our knowledge that the Soviets have a formidable ability to wage chemical warfare. We know the number of troops they have in their chemical units. We know the delivery systems they put their chemical weapons on.

We know some, but we are not comfortable that we know all their production facilities. We know some, but we have no confidence that we know all their storage facilities.

We are lacking much information that we would love to have from a tactical military sense about how they integrate this capability in detail in their doctrine.

Senator QUAYLE. Since verification is so important and obviously very difficult under this particular treaty we are talking about, I recall back in SALT II when the SALT II issue was submitted for verification, that was a critical issue.

At that time the administration came forth and said we are going ahead and beefing up some of our capability, research efforts, some analysis, to make sure we can verify it.

Are we doing essentially the same thing on this or are we saying we can't do it and let's proceed to onsite inspection?

Mr. EMERY. We are doing it, but you have to realize there are limits to technology which apply equally to chemical weapons. There are certain things to look for.

One is trace of material. What can you see, smell or detect, which is the chemical itself? That is one clue.

The other clue is to look for facilities that have certain characteristics.

For example, areas that are unique to chemical processing plants. Obviously, you are not going to look in areas where you know these facilities don't exist.

If you need a lot of water for processing, you don't look for a desert, that sort of thing. But you have footprints, you have tracks. You know there are certain things to look for and you know there are places where it is very, very improbable that you will find what you are looking for.

We have refined that sort of analysis to a very great degree, but in order to understand the final bit of information that you really need to understand, we are not just comfortable with relying on instrumentation and photography and NTM (National Technical Means).

We believe it is necessary to have particular instruments and people who are trained on the ground looking at facilities in question which is the reason that we have drafted Article X.

Senator QUAYLE. I don't dispute that. I don't dispute that is the proper way to proceed nor the best situation we can get, but my point is that with verification being so important in this, that we really need to increase our efforts collectively on data collection, on research, on analysis activities, and that is what I am trying to ask you.

Are there additional things we are doing in this particular area?

Dr. GOLD. The trend is in the right direction. There is a manyfold increase in the number of analysts we have put on in the last few years, but we need to do more. I take your question in the broadest context of analysis.

For example, if we get into detailed discussions with the Soviets and others. There will be proposals on the other side.

There is an interesting statement at the beginning of our draft treaty which has a prohibition against other activities in preparation for use of chemical weapons—that will make for very interesting give and take—e.g., suggestion have been made in the Conference on Disarmament to eliminate some types of exercises.

We need more analysis, both the paper kind and the kind you are talking about.

Senator **Quayle**. I would like to pursue this further and maybe we can do it after the hearing and try to get an idea of what in fact you are doing and how we can be of help to facilitate the augmentation of verification capabilities.

Mr. **Emery**. Senator, I certainly will work with Dr. Gold to provide you whatever information you want in that regard, but if you will permit me 3 minutes, I can give you a concrete example now which is illustrative of what we are doing.

At Tooele, Utah, we maintain a facility which is designed to devise practical ways of destroying chemical weapons and in fact monitoring their destruction in a way that will give us very accurate verification that in fact the material has been destroyed and not simply diverted to some other area for future use and also that will analyze thoroughly the materials, chemical characteristics to be certain that in fact what was destroyed was chemical agent.

That facility is operating now and is probably destroying chemical weapons as we sit here. A demonstration was put on for the CD Ambassadors last November which was very successful and in fact you or other members of the committee who are interested in that exact research and development project can certainly request a visit to the Tooele Depot and see it for yourselves.

That is an example of what you are talking about which is not only relevant, but critical to the success of verification of the treaty.

Dr. **Gold**. We are gratified with regard to the workshop. One of the major focuses on the workshop was our point that permanent presence of onsite inspectors is needed to verify destruction.

You don't need the permanent presence during destruction of production facilities, but for destruction of stock it is needed otherwise it is too easy for a host nation to divert.

The main point of the demonstration was a small number of specially trained international inspectors backed by the right kind of equipment is what is needed.

That was the apparent motion that the Soviets made earlier this year when they said they might be willing to consider the permanent presence of inspectors for the destruction of stocks.

The Soviets were not at the workshop, but many other nations from the Conference on Disarmament were represented.

Those of us at the table spent much effort in the workshop. I have to believe there is at least a bit of cause and effect of what went on in the workshop and what the Soviets announced.

Senator **Quayle**. Thank you.

Mr. Nunn?

VERIFICATION OF CHEMICAL TREATY

Senator **Nunn**. I was interested in the dialog you had with Senator Exon about the verification of a chemical treaty and the nature of what would be required on that, particularly comparing that with the difficulties in the Asat area which I think you alluded to also.

Could you repeat the difference between the verification required in the chemical area and the verification required in the Asat area? What is the difference?

Mr. **Emery**. Senator, I am not really prepared to go into the Asat activities to a great extent here. I can touch on it briefly.

Senator **Nunn**. You mentioned that it was because of the small nature of the Asat?

Mr. **Emery**. One point to make is that some Asat designs could very easily be disguised as something they are not. It is difficult to look under the shroud of the nose cone of missiles to tell what is there.

Senator **Nunn**. Even if you are onsite?

Mr. **Emery**. Obviously, you know if you are onsite.

Senator **Nunn**. If you are onsite?

Mr. **Emery**. If you are onsite, it is very difficult to do because unless you have the ability to get into the shroud, it is going to be very difficult to tell what is there or is not there.

Dr. **Gold**. I think the fundamental difference is our understanding of the issues. Our level of understanding is based on many years of working on this treaty, not only this workshop, but several other major papers.

At the very least I think there is a marked difference in our level of understanding of the issues.

Senator **Nunn**. If you have pervasive onsite inspection in the chemical area and you draw an analogy in the Asat area, why could we not verify an Asat treaty as well as a chemical treaty?

I can't see more difficulty than trying to identify a 200- or 300-millimeter artillery shell and see if it is a chemical weapon.

You mentioned in your testimony the fact that production facilities could be dispersed. Without getting into classified information, it is my impression that Asat capability is much less dispersed.

Dr. **Gold**. One chemical artillery shell would not change the military balance. So, at least in the chemical area we are talking about much larger numbers.

Senator **Nunn**. It seems to me everything you said in the chemical area builds the case for tabling something in the Asat area.

If you can verify all these things in the chemical area, I find it almost impossible to conceive you can't have pervasive onsite inspection in the Asat area. It is a question of whether the Soviets will agree to it.

This morning's paper carries an article about the disturbing effect on our allies of our position on the Asat in space.

It seems to me you are in a little bit of an awkward position to say on one treaty that you have tabled that you are going to have pervasive verification on site and on another treaty you are saying you can't verify at all when all the evidence I have heard indicates to me it would probably be easier to verify Asat, though very difficult.

Dr. **Gold**. Comparable at least. Both difficult.

Senator **Warner**. You and I rarely differ, but on this issue it seems to me that there are so many installations within the Soviet Union which are there for peaceful purposes, perhaps to send up a booster with a weather satellite, a booster with a communications satellite, but the interchangeability of those boosters is just an overnight situation to put on a payload which would eliminate a very significant amount of our satellite capability.

That would be one instance.

Senator NUNN. I agree on the difficulty, no doubt about that.

You are talking about the chemical area, a continuous pervasive onsite inspection. If you have that——

Dr. GOLD. We are not talking about continuous pervasive inspections for most aspects.

Senator WARNER. Mr. Emery said the quantum of chemicals that would be needed to have a significant military application could be detected and they could not guarantee isolated small amounts from flowing into the inventories.

Again, in the satellite situation, a single satellite could go up and at a critical point remove some of our essential systems. One firing could do it.

Mr. EMERY. I think the Senator is exactly correct.

Senator NUNN. Interestingly enough, you just said one of the reasons we are so well equipped to verify chemicals is because we have been negotiating with the Soviets in this area for sometime and discussing it for some time.

Yet we take the position in the Asat area we are not going to negotiate at all because of the difficulty.

It seems to me that is in conflict. You are basically testifying there is no conceivable set of verifications that we can table that would give us confidence in the Asat area, but there is in the chemical area.

I just do not understand that. I would stipulate and agree with you completely that both are very difficult.

Dr. WAGNER. Could I add one point?

Senator NUNN. Yes.

Dr. WAGNER. Mr. Emery used the phrase "looking under the shroud." I can imagine a situation where you might need to look under the shroud at what might appear to be an ICBM to see if it is an Asat warhead or ICBM warhead.

I find it somewhat incredible that the Soviets would allow us to x ray their strategic nuclear warheads.

Senator NUNN. You think it is possible they are going to do all these things we have tabled in the chemical area?

Dr. WAGNER. I think it is more possible than that they would allow you to X-ray or in a much more inclusive way examine ICBM's.

Senator NUNN. Don't they have to do some testing?

Are you saying they are going to put this on an ICBM and have no test?

Dr. WAGNER. Once the testing is concluded.

Senator NUNN. That is part of the verification, is it not?

Dr. WAGNER. Perhaps testing is a long ways from being concluded.

Senator NUNN. Part of the verification is to verify the tests made?

Dr. WAGNER. You do not have to test the system once it is operational and in place.

Senator NUNN. That is not the case now?

Dr. WAGNER. It could perhaps be the case for the Soviet Asat.

Senator NUNN. I think the administration is to be commended for your efforts in the chemical area. Everything I think you have said in the chemical area puts you in a difficult position particularly vis-a-vis our allies who have no concern whatsoever in the Asat area, as difficult as it may be.

I don't anticipate anything will be easy in this area especially to take a position we can't envision anything in this area that we could possibly verify when you have all of these very pervasive types of verifications in this chemical treaty.

It seems to me you are in a little bit of an awkward situation, though I do recognize the difficulty.

Senator WARNER. Mr. Chairman, if I might take a minute.

Throughout the years the Senate has been confronted with the problem. I, from time to time, have gone back in history to document the experiences of our forces in World War I.

I have here, which I will not put in the record, the oral histories taken of four officers in the Marines with whom I have had the privilege to serve, Generals Clifton Davis, Erskine, Thomas, and Silverthorn; lieutenants, captains, and majors, describing what happened when the Marines came under attack by chemical weapons, and it is incredible, the stories of these men, how they were distressed to the point they broke, and the personal suffering and the like.

I urge those who have time, to take a look at this set of documents. I want to conclude the World War chapter with a statement by General Pershing in his final report to the Congress and I quote:

> Whether or not gas will be employed in future wars is a matter of conjecture, but the effect is so deadly to the unprepared that we can never afford to neglect the question.

Proceeding then to World War II, I have here the statement issued by Winston Churchill in 1942 and I quote:

> We are ourselves firmly resolved not to use this odious weapon—referring to chemical gas weapons—unless it is first used by the Germans and if Germany uses chemicals against Russia, we will use our great and growing air superiority in the west to carry gas warfare on the largest possible scale far and wide against the military objectives in Germany.

He repeated this threat of massive retaliation on Germany again in April 1943, adding military objectives including ammunition centers and seaports.

The United States followed Britain's lead. Soon after entry in the war, President Roosevelt on June 5, 1942, enunciated U.S. policy of no first use and effective retaliation against Japan if she persists in the use of chemicals against China.

On June 8, 1943, he followed with a broader statement covering all axis powers. In this latter statement he again stated the United States would not first use chemical warfare and a promise of full and swift retaliation in kind upon munition centers, seaports, and other military objectives throughout the whole extent and territory of the axis countries that might use chemical weapons.

Then by research into the archives of the German Army, we discover the following:

> In 1949 General Ochsner, Lieutenant General, German Army, stated as follows:

"Quite considerable stocks of chemical agents have been accumulated by the time this stage," early 1944, "of the war was reached. These included gas munitions to be used by ground and air forces as well as chemical projector forces.

"There was also time to make the necessary arrangements. In short, from all angles the idea seemed to hold out good prospects of success and no technical difficulties were expected.

"Nevertheless, the idea had to be abandoned. The enemy," referring, of course, to the allies, "the allies' superiority in the air had become so overwhelming in the meantime that the initiation of gas warfare by us," the Germans, "might have incalculable consequences for our homeland if the enemy had decided to retaliate and bomb our factories, communications facilities, with gas, thus compelling us to carry out extensive decontamination work, not to mention the detrimental effect gas would have on the morale of the population of big cities already severely stricken."

There it is. If we fail to heed history, history will repeat itself.

Again, it is a dual track, arms control. I don't know that this President or any other President at this time can neglect the responsibility to go forward to provide adequately to protect the men and women of the Armed Forces who have volunteered to go to remote places in the world in the cause of freedom of this country and the freedom of the whole world.

Senator NUNN. Mr. Chairman, I agree with those remarks. I think that is a significant addition to these hearings.

I do think the dual approach is essential. Even though we may not be in the majority, I identify with those remarks.

BREACH OF ASAT TREATY

I have one other question on the previous point that Dr. Wagner made and I think, Senator Warner, you made about the consequences of a breach of an Asat treaty with only one or two missiles capability.

I think if you look at the chemical area and look at General Kroesen's classified statement, on page 3, you will see that kind of breach in the chemical area would also have a very serious consequence; in other words, a small breach.

Senator WARNER. I have shared with you the hope that we could achieve an antisatellite treaty, a test ban, a variety of approaches in arms control.

Having supported last year, myself, and voted for the Tsongas resolution, testimony this year before the Armed Services Committee seemed to strip away many of the foundations on which I and others supported the Tsongas amendment.

Senator NUNN. I think that is probably true, Mr. Chairman.

I think there are a number of questions about the accuracy and validity of that testimony. I think we are going to have to look further into it. I think that is still an open question that deserves a lot of examination.

ASSUMING VERIFICATION/ASSUMING BREACH

May I ask one other question on another subject before we go into closed session?

Mr. Emery, we had a long and, I suppose from both points of view, a fruitful dialog with Richard Perle about the real dilemma, assuming verification, assuming breach by the Soviets, and assuming that we identified the breach. In several instances the administration now feels that they have indeed identified breaches of existing treaties by the Soviets and, of course, the dilemma is, as Richard Perle pointed out, that we have nothing in the previous treaties that provide sanction for those who are breaching existing treaties.

The testimony was about 6 weeks ago, in all future treaties that is one imperative, that we have sanctions and in effect punishment or at least leverage that would be built into the treaties to prevent that from occurring, to help deter it or to deal with breaches once they had occurred.

My question is: What is in this chemical treaty which has been submitted since that testimony and since the indepth search about Soviet violations, that would give us sanctions in the event there is a breach that is identified by us?

Mr. EMERY. Senator, we do not have a sanction provision in the treaty. There is always a great debate over what you could add to a treaty of this kind that would work.

Obviously, you can't throw the leadership of a country collectively in jail. You don't want to take precipitous military action that will cause worse problems.

There are all sorts of economic embargoes and things that have been tried with varying degrees of success. Of course, when you try to negotiate that kind of provision in a multilateral forum such as CD, you greatly complicate and frustrate the effort simply because it is very difficult to get agreement on other substantial items, let alone sanctions.

So, it is a dilemma. It is a difficult problem. Of course, any nation that is aggrieved by a violation by another nation certainly has a right to withdraw from a treaty and defend itself in kind, which is a principle of international law relating to treaties that has been accepted.

Senator NUNN. That means that the new treaty that has been submitted in this administration has the same pitfalls as the old treaties that we are now frustrated with and that have been so roundly criticized?

Mr. EMERY. One thing that differentiates this treaty from its predecessors, particularly from the 1925 Geneva Protocol, is that it is not just simply a statement of each nation of no first use or no use, but in fact goes far beyond that by allowing all nations to know whether a nation is producing chemical weapons or destroying them, where the chemical facilities are and provides means that have never existed before, so far as I am aware, to investigate suspected facilities.

BREACHING OF TREATIES

Senator NUNN. I agree with that and I think that is necessary. I don't diminish the importance of those provisions. I think they are important.

Nevertheless, this administration has already taken the position that without any doubt the existing treaties are being breached.

So, all the things in this treaty basically would get us to the point of denouncing the Soviets for breach of a future treaty on chemicals and we are already at that point.

What are we doing about that? That is the question.

We are already at the point where we know that there are breaches and we aren't able to do anything.

What you are describing is a new treaty that has pervasive verification procedures with which I agree, but we don't have any sanctions.

What are we going to do about it?

We are already in that dilemma. It has been described as one of the great problems in arms control.

Some people in the Defense Department implied we should never enter into a treaty like that, but here we are tabling another one.

Mr. EMERY. I think one of the major problems with the treaties that you have referred to that have been violated or breached is that verification measures in some cases were either nonexistent or were so poor and lax that we were not able to identify a particular breach until long after the fact or until it was a fait accompli.

I don't know how much we ought to talk about it in open session, but this matter of the radar that has been reported in the papers, if we had known about the radar or seen the radar when the ground was first being broken, we certainly would have had a far greater possibility of preventing it from being a breach of a treaty than discovering it when the darn thing is almost ready to be used.

Senator NUNN. In the chemical and biological area we are talking about the continuing acts of breach?

Mr. EMERY. Yes; we are.

Senator NUNN. In Afghanistan and Southeast Asia. It is a matter of history we are talking about things that are continuing to occur.

Mr. EMERY. Under existing law there is no provision in any treaty that gives you the opportunity to inspect, to examine, to visit facilities in question and to really tie up——

Senator NUNN. Those are all means to verify what that was when the breach occurred.

In the case I am referring to we have already pronounced our certainty that indeed the breach occurred.

All the things you are describing are simply to get us to the point where we already are with existing treaties.

I don't have an answer, but there continues to be an implication that this administration is going to have an answer to that and previous administrations have been derelict in not providing for that in the treaties.

If you make that remark to which there is some validity, then it seems to me you have an obligation to come up with an answer.

Mr. EMERY. I think the point you have identified is certainly very valid. We agree with it, understand it and we want to try to solve that problem.

There is no general agreement at the present time on how we are going to approach the question of sanctions because in my own view and the view of other people there is no sense to have a list of sanctions or remedies of punishment that you know darn well can't ever be implemented or that are so weak and so vague that they have no practical effect.

It is a problem that we have tried to deal with without a successful solution.

One of the problems with the past treaties is that the treaties are vague and the ratification provisions are so vague that in some cases the Soviets just said you interpreted the information incorrectly and there has been no way to prove or disprove that what we believe is happening is in fact the case to the extent that it will be accepted by all nations of the world in a way that they can pass at least intellectual judgment on the conclusions we draw.

You and I both agree, as we have stated here several times, facing up to the verification provisions will certainly make it much easier to build a case and hopefully to build it soon enough so that the problems will not get totally out of hand.

It is an improvement. Certainly if we can find a way to tighten up on the point that you raise with sanctions or other provisions, we will be most anxious to do it. We just don't have a clear idea of what we could adopt that in fact would——

Senator **NUNN**. Is it fair to say you would be reluctant to criticize the previous efforts of others who have also failed in these areas? The administration statement that implies that previous treaties should have anticipated sanctions and that those who negotiated those treaties, both Republican and Democratic administrations, implicitly have been derelict in their duties now have been withdrawn?

Mr. **EMERY**. Senator, from your smile, you have read something I haven't read.

Let me say we reserve the right to criticize, but we also share the understanding that there are a great many problems that are extremely difficult to solve and rhetoric is not going to do it. Substantive work is going to do it.

We are open to any suggestions that will resolve those problems that may provide us sanctions that work. Some work and some don't. I think that is the history of the last few years.

Senator **WARNER**. Mr. Chairman, as we are now about to proceed in closed session, I want to read one last paragraph from the historical analysis of World War I on gas for the marines.

> Had the war continued for another year, it is generally believed that the campaign of 1919 would have been largely chemical war. The nominal rise of chemical use from mere obscurity in 1915 to the position of the primary military weapons in 1918 is unique in the history of warfare.

This chart shows, beginning in 1915, the rapid rise of use by the Germans, until 1918 it was up here, all other countries began using it, the British, the Austo-Hungarian empire, and the United States just barely a flat line, again because probably we just were not equipped.

If you look at the casualty ratios in World War I, Russia took 56,000 deaths, and 475,000 additional casualties, showing a ratio of 1 death to 8 gas casualties total.

The United States, 15,000 deaths to 73,000 total casualties, showing 1 death out of about 4 casualties.

Senator **LEVIN**. Mr. Chairman, could I ask a couple questions before we go into executive session?

Senator **QUAYLE**. Senator Levin?

Senator **LEVIN**. Perhaps you have gotten into this. If you have, just let me know and we won't duplicate it.

FORWARD STORAGE OF BINARY CHEMICAL MUNITIONS

How many of our NATO allies have agreed to forward storage of binary chemical munitions?

Dr. **Gold**. None. We have not asked. We have no plans.

Senator **Levin**. You have no plans to forward storage?

Dr. **Gold**. As you probably know, we do have munitions stored in Germany now.

Senator **Levin**. We have not asked our NATO allies nor do we have any plans for storage of binary munitions?

Dr. **Gold**. Of any of the new munitions, that is right.

Senator **Levin**. Forward storage would not improve the deterrent?

Dr. **Gold**. Forward storage enhances their value, but even without forward storage, particularly with the binaries, we believe we are buying an adequate amount of deterrence.

The binaries allow transport much more easily than the unitaries. Further we have military commitments in place other than Europe, and we may face the chemical threat in places other than Europe as evidenced by the Iraqi use.

Binaries particularly allow storage on ships which we cannot safely do with the unitaries, so, they provide the flexibility needed to meet what is becoming a world wide chemical threat.

Certainly peacetime forward deployment would enhance deterrent value, but it is not essential. If we don't have effective chemical munitions, it takes years to build them. If we have adequate stockpile in the United States, we can get them where they are needed quickly, if necessary.

Senator **Levin**. If it improves deterrence, why don't we ask our allies to store them? Why haven't we?

Dr. **Gold**. I believe the answer to that is that it would be unwise at this time because of other alliance problems.

Dr. **Wagner**. It is a question that they might not have to face for years.

Senator **Levin**. We may ask them to do it?

General **Klein**. Yes; I think militarily we would ask them to store weapons. It is a much safer weapon and it would pose fewer problems.

Senator **Levin**. Do you all agree we have not discussed with our allies that question up to now?

Dr. **Gold**. Of storage of any new weapons, yes.

Senator **Levin**. My last question is this: I think Secretary Emery said that the Soviets have shown some forthcomingness in considering onsite inspection relative to the stockpile?

Mr. **Emery**. That is correct.

Senator **Levin**. That is true even though we have not yet decided to proceed with the production of binaries. Is that a fair statement?

Mr. **Emery**. Yes, that is a fair statement.

The issue of production is one that the Soviets are certainly aware of. I think the reason that they agreed with forthcomingness on stockpile destruction is unrelated to that.

Dr. **Gold**. I cannot prove cause and effect, but the Soviets made their first move in August 1983, a month after the Congress has authorized money for production. That was the first time, to my understanding, that they have made any acknowledgement that they are willing to consider onsite inspection.

Before that we have been unable for over a year to get them to elaborate on the very subtle hint that they alluded to in their June 1982 paper plus during the 3½ years of negotiations of the previous administration they never came close.

Again, it is an area you can't prove cause and effect.

Senator LEVIN. That does raise one additional question.

You would like us to follow a two-track approach on chemical weapons, as I understand Mr. Emery's suggestion. We are not following that on Asat.

Have you urged from ACDA's perspective that we follow a two-track approach on Asat weapons?

Mr. EMERY. The Arms Control Agency is spending a lot of time and effort in examining the Asat possibility and also examining all the various aspects of SDI.

As I testified to Senator Exon and Senator Nunn previously, we just simply have not come to a conclusion that allows us to go forward with any particular proposal in concrete form.

That is not to say it won't happen, but we are not at the point where we consider that advisable.

Senator LEVIN. You have not recommended a two-track approach on Asat?

Mr. EMERY. We have not at this point.

Senator LEVIN. Thank you.

CHEMICAL WEAPONS/ASAT—TWO DISTINCT ISSUES

Senator QUAYLE. I want to say one thing because that question has come up quite a bit today.

I hope that the negotiations on a ban of chemical weapons doesn't get bogged down for lack of movement on Asat. I think they are two distinct issues.

I think the idea of getting potentially some kind of onsite inspection of a chemical ban might be helpful to Asat or any other treaty.

We have been on a real slide on arms control since the ratification of SALT I. I think, if we can get something cut on this chemical ban, that we should not lose sight of it. I think it is very important that we all move forward and move forward in sync on chemical ban.

Senator NUNN. I agree with that. The analogy I was talking about is simply one of the question of whether we should indeed be tabling an Asat treaty.

In no way do I mean to imply that chemical treaty negotiations should await Asat.

Senator QUAYLE. That is certainly an open question. I don't want to confuse the two or say that necessarily we have to do something in Asat before we do something with chemical weapons. The two go together.

Senator NUNN. Nobody has been talking about the two going together. I haven't. I want to make that absolutely clear to all witnesses.

My point was one of analysis and whether we had an analogy. I do not think there is a connection between the two except from the point of view of whether we indeed should be looking at the pervasive verification that we have acquired in the chemical and applying that analogy to the Asat.

In no way do I imply that one should await the other.

Senator **Quayle**. I just want to reiterate this seems to be a very good proposal and I encourage you to go forward with it and particularly get something on onsite inspection.

If you can get a breakthrough on onsite inspection, think of what that would do to other treaties.

Senator **Warner**. We have a serious definitional problem here. We can define a chemical weapon, but in Asat we have an ABM that could be used for Asat, we have lasers, we have all kinds of weapons that could be used for Asat.

It is extremely difficult to define.

Senator **Nunn**. This chemical definition is clear. Let me read this:

> Supertonic lethal, other lethal, and other harmful chemicals and their precursors, except for those chemicals intended solely for permitted purposes as long as the types and quantities involved are consistent with such purposes and except for those chemicals which are not supertonic lethal, or other lethal, chemicals and which are used by a party for domestic law enforcement and riot control purposes or used as a herbicide.

Mr. **Emery**. Mr. Chairman, I should point out that there are two extensive annexes which attempt to elaborate on that in detail.

Senator **Levin**. They may make it worse.

Mr. Chairman, let me assure the witnesses the issue is not whether we should mix the two. The question is whether logic which has driven you to a two-track system on chemical warfare should not drive the administration on a two-track approach on Asat.

The administration said one track on Asat, but two tracks on chemical because one track will drive the second track.

The only way we can get agreement on chemicals is if we decide to produce them, but on Asat just go ahead and produce.

That does not mean we should not drive ahead on a chemical treaty. I am all for it, too.

Senator **Quayle**. There is a certain starting point. They have made a decision this is going to be the starting point. This is going to be the major vehicle that they are going to push on the arms control initiative.

We can debate on taking this kind of approach to Asat at a later time. We have to start somewhere. We have to get a breakthrough somewhere if we are going to get into arms control.

It seems to me this is a perfectly reasonable place to start and a reasonable proposal.

Senator **Nunn**. The witnesses should know that we are all in agreement on that point.

Mr. **Emery**. Senator, that is helpful to us. We appreciate your support and encouragement. We invite any input, suggestions, criticisms that you as a committee or individually can provide us.

[The prepared statement by Brig. Gen. Alexander K. Davidson follows:]

PREPARED STATEMENT OF BRIG. GEN. ALEXANDER K. DAVIDSON, DEPUTY DIRECTOR OF OPERATIONS, HEADQUARTERS, USAF

FISCAL YEAR 1985 STATEMENT TO CONGRESS

Mr. Chairman and members of the Committee, I am pleased to have the opportunity to discuss the Air Force Chemical Warfare Program. I'll begin with a review of our efforts in the area of defense.

The objective of our Chemical Warfare Defense (CWD) program is simple and straightforward—to ensure our personnel can survive a chemical attack and continue operating from contaminated air bases. We have now fielded first-generation aircrew and groundcrew protective ensembles, automatic nerve-vapor detectors, and lightweight decontaminatin systems. We are conducting intensive training on this equipment, emphasizing the performance of wartime tasks.

The AF posture for CWD equipment has steadily improved, particularly in the area of individual protection. Approximately 90 percent of all forces located in or deployable to high threat areas have 3 sets of protective ensembles. Our aircrews will be 100 percent equipped upon delivery of the 1984 procured CWD equipment.

Collective protection remains our most critical near-term requirement. Currently our capability to sustain combat operations from contaminated air bases extends for only the length of time people can work in protective clothing. Effective collective protection systems are an absolute necessity for our aircrews and support personnel to eat, sleep, take care of bodily functions, and either decontaminate or exchange contaminated suits for clean ones.

Some functions on an airbase cannot be suspended during an attack, such as squadron and combat oerations centers and aircraft maintenance shops. Buildings for these functions are hardened against the effects of conventional weapons. Collective protection must be added to these facilities to provide uncontaminated work areas for mission continuity during chemical attack.

Our procurement of first generation individual protective equipment is on schedule and will be completed by July 1984. Procurement of a new groundcrew mask as well as improved gloves for aricrews and ground personnel is being continued in this year's request. Initial procurement of the automatic liquid agent (nerve and blister) detector and the US-designed survivable collective protection system is planned for fiscal year 1985. The addition of collective protection to 11 mission-critical, semi-hardened facilities in USAFE is also included in the fiscal year 1985 request. Procurement of the lightweight decontamination system will be completed in fiscal year 1985.

Research and development is being continued for body cooling systems, advanced detectors, and aircrew eye/respiratory systems.

The increased funding in fiscal year 1985 will provide continued progress toward reducing mission degradation in a toxic environment and improve our ability to conduct sustained operations. However, defense alone is not enough. The United States must have a credible and effective retaliatory capability. The Air Force needs a capability to deliver persistent agent at long range to deter Soviet use of these weapons.

Our forces must be able to survive an enemy attack while retaining the ability to then strike back at the enemy forces. In other words, we must have a strong defense and a strong offense if our adversaries are to be effectively deterred from initiating conflicts with the United States or our Allies. This doctrine has served the nation well for years and it is the basis for all of the DOD chemical warfare programs. As one of our NATO Allies pointed out, fighting a chemical war strictly from a defensive posture is a no-win proposition.

What is desparately needed is a credible retaliatitory capability to deter the enemy's use of chemicals from the outset. For the Air Force, a credible retaliatory capability means being able to strike targets beyond artillery range with persistent agent chemical munitions. The persistent agents are required against long range targets for the following reasons:

(a) Our forces have to penetrate high threat areas to get to these high value, long range targets and persistent agent weapons last a long time (days to weeks) so we don't have to go back very often.

(b) Targets attacked by persistent agent weapons would not be candidates for Blue force occupation in the near term so we don't face contamination problems from our own weapons.

(c) Persistent agent chemical weapons present unique decontamination problems to the enemy. He must either cease his warfighting and decontaminate the attacked areas, or he must attempt to perform his operational tasks in protective clothing which will drastically reduce his combat efficiency.

NOTE.—The enemy would attack our airfields and other long range high value targets with persistent agent chemical weapons for the exact reasons mentioned above.

The AF cannot fulfill its chemical retaliation mission using the present chemical weapon stockpile. Our present long range chemical weapons are neither effective nor credible as a deterrent force. The existing weapons are either bombs filled with non-persistent agent whose effect lasts for only a short period (minutes), or ineffective spray tanks designed to be used in a low and slow delivery mode—a virtual suicide mission in today's high threat environments. To explain the problem more completely, let's look first at the non-persistent agent chemical bombs now in our inventory. Although the delivery tactics can be flown by modern aircraft, the type of agent contained in these weapons is a liquid which vaporizes and dissipates almost immediately after delivery. As a result the enemy can quickly shed his cumbersome protective suits and resume fighting normally. To present a meaningful threat to the enemy, the AF would have to reattack these targets every few minutes using this type of agent. Obviously this is not possible.

Spray tanks, the other type of air delivered chemical munition now in the inventory have the desired agent (persistent VX) but they are designed to be used at low speeds and altitudes from straight and level flight. This type of tactic would certainly result in unacceptable attrition to the carrier aircraft. Thus, the AF simply does not have chemical weapons suitable for attack of long range (and generally well-defended) enemy targets like airfields, logistic nodes, parts and the like.

The Soviets do not face such a problem. They have an array of bombs, rockets and missiles to deliver persistent chemical agent against all appropriate NATO long range targets. Although they too currently have spray tanks in their inventory, it is unlikely they consider these any more useful than we do; therefore, when we compare assets, we find the Soviets have numerous effective options to deliver persistent agent at long range while we have none. The near term solution to this imbalance is the Bigeye.

The Bigeye is a binary, persistent agent chemical bomb. Binary means the bomb has two relatively non-toxic components which are not mixed until after the weapon is released from the aircraft and directed at the target. This is a major improvement over our present weapons which are of unitary fill design. Because these unitary weapons contain a lethal chemical in an active state, they require special handling precautions which create significant safety, storage, and logistic problems for our forces. The binary concept eliminates virtually all of these handling difficulties, and results in a quantitative increase in safety for all personnel required to work with or near the weapon. Additionally the Bigeye represents a major improvement in operational effectiveness. It has the right agent to do the job (persistent VX) and delivery profiles (loft release) which are compatible with today's combat environment. In short, Bigeye will give the AF the ability to effectively perform its long range chemical deterrent role.

I solicit your support for the DOD fiscal year 1985 program for Bigeye. While our recommended program does not involve production of any full-up rounds, it does place the Services in a position to respond quickly if Congress does authorize such procurement. It is also our belief that support of the fiscal year 1985 binary modernization bill will send a clear and positive signal to the Soviets in the Committee on Disarmament. It accomplished this while stopping short of approval for complete rounds and retaining the full range of disarmament options.

Senator QUAYLE. We will take a short recess so that the room can be cleared for an executive session.

EXECUTIVE SESSION

Senator QUAYLE. In consultation with my colleagues, I think what we will do is just hear the intelligence briefing on chemical warfare and defer theater nuclear force testimony for another day.

We will lead off with General Kroesen.

STATEMENT OF GEN. FREDERICK J. KROESEN, U.S. ARMY (RET.), FORMER COMMANDER-IN-CHIEF, U.S. EUROPEAN COMMAND

General KROESEN. Mr. Chairman, please allow me to express my appreciation for the opportunity to discuss a very important subject, one that exposes a [deleted] flaw in the posture of our Armed Forces.

CHEMICAL WARFARE—READINESS OF U.S. FORCES

I am speaking of chemical warfare and the readiness of our forces to survive in a battle arena at any time between now and the foreseeable future; that is, the far end of the current 5-year defense program.

Mr. Chairman, in 1979 Congressman Richard Ichord wrote an article, published in "Readers Digest" entitled, "The Deadly Threat of Soviet Chemical Warfare," in which he observed that, and I quote: ". . . the Soviet Union has perfected and stockpiled the most frightening array of chemical weapons in history."

He described a sophisticated catalog of destructive chemical compounds that kill or incapacitate by attacking respiratory, blood, or central nervous systems against which we have only a rudimentary defense.

He concluded that the Soviet forces are immersed in chemical weapons tactics, doctrine, equipment development and employment, and training that, and again I quote: ". . . it would be odd if they did not employ them."

And further: "We are whistling past the graveyard" if we fail to develop and reestablish our chemical employment capabilities.

In recent months I was privileged to head a study group of senior retired military officers who were asked to evaluate the chemical warfare posture of the United States and NATO forces which might be employed in NATO to oppose a Soviet-Warsaw Pact attack in which chemical agents might be employed, to ascertain how NATO commanders might respond to such an attack and how NATO forces would survive and function in a chemical environment.

We completed our study, writing a narrative text of nearly 500 pages which describes the impact of chemicals on the battlefield, the advantages and disadvantages associated with such employment, and the conclusions drawn from an assessment of the results which can be foreseen if the Soviet threat is matched against the United States and NATO programmed chemical capabilities in the year 1990.

In our study we learned that Congressman Ichord was quite correct in his 1979 assessment, [deleted].

We believe that this observation, that it would be odd if they do not employ chemicals, should be supplanted [deleted].

We found that the Soviet forces have a most versatile collection of chemical agents and delivery means, and a stockpile which assures [deleted] sufficient means to employ chemicals in any concentration [deleted].

Against warned, protected targets he causes an immediate operational degradation as troops encumbered with their protective gear lose [deleted] percent of their operational effectiveness.

Under these conditions, we gained our first appreciation of the asymmetry of the battlefield which occurs when one side is fully encumbered with defensive gear while the other, not faced with a retaliatory attack, can be quite selective in its offensive employment and thereby assure that the bulk of its forces do not suffer the same degradation in dexterity, tactility and the psychological trauma associated with being sealed in protective clothing.

It is quite apparent that there would be no contest between two football or basketball teams if one of them had to play dressed in chemical protective uniforms.

[Deleted.]

The possibility of winning militarily while inflicting no, or only minimum, collateral damage to the infrastructure certainly commends chemical warfare to the attention of a nation bent on conquest and subjugation.

This feature alone has to be attractive to Soviet decisionmakers who would like to have Western Europe's industrial complex intact.

Finally, the study team highlighted the enhanced pace of operations which results if chemicals are used in support of conventional operations.

Early breakthroughs and more rapid exploitation can be easily foreseen. General Bernard Rogers, Supreme Allied Commander, Europe, in his public speeches urging the improvement of NATO's conventional forces, has stated that he believes he will have only 7 to 10 days before he will have to request authority to employ tactical nuclear weapons.

In our opinion, if the Warsaw Pact forces employ chemicals in support of their conventional attack, General Rogers will [deleted].

The weakness of our position, of course, is the [deleted] lack of a militarily significant retaliatory capability. No other factor has anything approaching the influence of retaliation as a means of eliminating asymmetry, of balancing the operational effectiveness of the troops employed.

No defensive measure of mechanism, unless one believes in the possibility of immunization against nerve gas and cyanide and mycotoxins, no defensive measures can begin to redress the operational imbalance that occurs if one side can employ chemicals and the other cannot.

[Deleted.]

These observations, of course, point to the conclusions of the study:

That the Soviet Union is ready, willing, and able to employ chemical warfare in support of military operations.

[Deleted.]

Perhaps most importantly, we concluded that the current imbalance of chemical capabilities lowers the nuclear threshold;

[Deleted.]

Finally, a point which we had not found previously expressed, we concluded that all of the current efforts to modernize our forces, to see the battlefield better, to move more rapidly, to shoot faster and further, to improve command and control and communications, to strike deep, all of these things are hostage to our refusal to modernize our chemical delivery capabilities [deleted].

We believe that to ask soldiers, sailors, airmen or marines to go to war facing this situation should be unthinkable.

Mr. Chairman, that completes my prepared statement.

I have brought some copies of the findings and conclusions that we drew during our study. I am prepared to pass them to you if it will help in asking questions.

[The findings and conclusions of the study follow:]

[Findings and conclusions: deleted.]

Senator WARNER. Dr. Gold?

Dr. GOLD. The report has been made available to the committee. We can send over additional copies.

Senator WARNER. Why the necessity for such a high classification?

As I sit and listen, I can almost piece together bits and pieces of testimony that has been given to this subcommittee and committee as a whole.

Mr. Wagner?

Dr. WAGNER. Senator Warner, this is a new thing to us.

Senator WARNER. What is new?

Dr. WAGNER. The appreciation of the magnitude of the impact is a new thing. Studies done in the past are the sort that I must say I don't think very much of where an analyst sits down and works numbers through a computer trying to model how troops behave on the battlefield, show results of 30 percent, 50 percent degradation.

General Kroesen's study, the detailed look, and the kind of experience that General Kroesen and colleagues can bring to the vignettes of the details of how chemicals would interact on the battlefield, show case after case of things that one has not thought of before.

The integral of all of that, the summation of all of that, makes the impact just that much greater.

The other thing that comes across is because of that greater impact, it has changed the prospect for us from one that has had a kind of hypothetical cast to it in the past.

The Soviets had chemicals, yes, they are using them in various places in the world, [deleted].

What General Kroesen and his colleagues are showing is that I think that [deleted].

Senator WARNER. In that sense you might lose the authorization this year because this type of testimony could well sway public opinion and the views of our colleagues to give support to the President's program.

Dr. WAGNER. I know. It is tempting, it would be tempting for us, I think, to try to use this testimony that way.

Senator WARNER. We don't have to pressure for a judgment call on this right now.

I will just ask one question of General Kroesen.

If you were the Red army commander, would you initiate the battle with chemical warfare?

Why grind your troops up in a conventional battle for a while if you have this much of an advantage?

The first shot fired then is going to be chemical?

General KROESEN. As I said, I believe [deleted].

Dr. **Gold**. To put the study in some perspective, I asked them to make sure to bend over backwards not to exaggerate the role of chemicals. We wanted their best judgment of what they believe is the role of chemicals.

I also asked them to make the report as unclassified as possible. They did that by reluctantly agreeing not to make it top secret. [Deleted.]

General **Kroesen**. May I address that question?

We did attempt, Senator Warner, to write an unclassified report in the beginning because we felt that most of the facts are known, but we concluded in the end that [deleted].

Dr. **Wagner**. If I can draw an analogy that from time to time it occurred to me in the history of nuclear weapon programs [deleted].

Senator **Nunn**. This is almost exactly the same conclusion [deleted].

Mr. **Gold**. [Deleted.]

Senator **Nunn**. [Deleted.]

Senator **Warner**. This is an election year. If you really want something distasteful to the general public, get out there and advocate chemical weapons.

I feel obligated to do it. I am going to take the risk. I don't know how many colleagues will be able to join me.

Senator **Nunn**. I have supported this. It is very unpopular. It is hard to explain.

You have to hold audience attention for 30 to 40 minutes. You can't explain it in 30 to 40 seconds in a TV interview. If you don't pass it in the House or can't pass it in the House, there is a real question as to whether we might even weaken our position in the long run in the Senate by requiring another vote.

Every time you require another vote over here, you have that many more people who are in harm's way politically and every time you do it, you get fewer votes the next time.

We can't go to the well over here and ask for votes and not have any chance of getting it through the House.

Dr. **Gold**. We understand that all too well. We are focusing on the House. We expect it will come up in the House first.

Senator **Warner**. Have they received benefit of General Kroesen's report?

Dr. **Gold**. They have received the report not a briefing, just the report itself. We work it into all our briefings on the one-on-one meetings we are doing.

Senator **Nunn**. You ought to try to set up some briefings over there, General.

Senator **Warner**. I certainly agree with Senator Nunn.

Dr. **Gold**. If it were not an election year, I would feel pretty good about how we stand this year. We have structured our program, taking the lead from what you people did in the authorization bill last year.

We are not asking for production funds, but something more restrained and it makes an awful lot of sense to prepare for production.

We have capped a very vigorous arms control effort with this draft treaty.

Perhaps most important from our own internal perspective we understand the problems better. Don't forget that there has been a decade of neglect in this area. We are increasing our understanding and perhaps are more articulate in explaining the dangers that we face.

Senator **Warner**. Don't neglect that. I am not saying that critically.

Dr. **Gold**. We got closer to it last year than the year before.

Dr. **Wagner**. May I pursue this point a bit further?

We debated long and hard about whether or not to raise this issue this year. We decided to raise it for several reasons.

One is because I think it would be irresponsible not to give it a try when we need it so much, but the other is that we do feel we have made some progress, especially on the House side, as evidenced not only by the narrowing margin, but simply by the opinions of people and the understanding that many people now have and evidenced in the hearings.

Our House hearings this year before Representative Stratton's committee were a model of informed discussion, I thought, with one or two exceptions.

That was not the case a couple years ago.

Senator **Nunn**. How about the Appropriations Committee? Can't you go before some other committees because the problem is not Armed Services?

Dr. **Wagner**. I think we can. We did not want to lose the momentum of activity by a year.

Senator **Exon**. I don't see any reason why this should be classified secret. There is no great secret as far as I see it.

I first would like to ask why it is classified secret? Maybe there are one or two force posture statements in this that we would want to delete.

I still say what my colleagues have said and I say that as one who has voted for all chemical weapons as they come down the pike. The President of the United States, the great communicator, should say these things to the people. I call upon you to try to do that.

I call on my colleague, who sits on the other side of this table, who has more influence at 1600 Pennsylvania Avenue than I do, to bring that about. I think it would help us, it would help you, General, if the President would take a more forthright stand. It might well be that this great initiative of the Vice President in going over there to lay down a magnificent proposal that we all know is not going to be acted upon in the near term might be good politically, but I don't think it is very good for the force structure and projection that you have to deal with, General.

I just say it is time we get serious about this and bring all our forces to bear. I will be there, like the Senator from Virginia and the Senator from Georgia, to do what I can to defend it.

Senator **Warner**. The statement by Mr. Exon is well taken. Unless we have a consolidated support from the administration from the top down, we have little expectation of getting this program through the Congress.

Now, we are dealing with something of a conflict between the need to provide for the protection of our forces, particularly those deployed in Europe, and the need to protect sensitive national security information such as that included in this report. Can we achieve the necessary support for an important program like this without releasing this information?

Senator NUNN. Maybe we ought to put it out. We don't have the credibility that the 21 members of General Kroesen's panel would.

Senator WARNER. With apologies to the witnesses and members of the committee, Mr. Nunn and I have to attend another military briefing.

Senator QUAYLE. I might say, Mr. Chairman, while you are here, it seems to me you have to go forward and discuss this as much as possible. I agree with what Senator Exon says.

Senator NUNN. [Deleted.]

STATEMENT OF MAJ. GEN. WILLIAM E. KLEIN, U.S. ARMY, VICE DIRECTOR, PLANS AND POLICY DIRECTORATE, ORGANIZATION OF THE JOINT CHIEFS OF STAFF

General KLEIN. I want to emphasize that General Vessey and the Chiefs, are very, very concerned about the study and about that document that is labeled secret [deleted].

The Chiefs want this program. The modernization of our chemical program is one of their top priority items, [deleted].

Senator WARNER. Don't you think they already know it?

General KLEIN. I think they do, [deleted].

Senator NUNN. The element is not if they know that, that they are going to go to war, [deleted].

General KLEIN. That is correct.

Senator NUNN. I suggest they do some briefing General Kroesen and his group, as much as possible. I think it would be very impressive if you could have two or three of your people come up more or less independent from this administration and brief some people on the House side because you do have great credibility.

Senator QUAYLE. Do you want to proceed with the intelligence aspects of it?

Dr. WAGNER. If you would like.

Senator QUAYLE. If you could condense it to 15 minutes.

STATEMENT OF DOMINIC GASBARRI, INTELLIGENCE ANALYST, DEFENSE INTELLIGENCE AGENCY

Mr. GASBARRI. I would like to give you a quick overview on chemical weapons proliferation. We will also update you on the Soviet activities.

As you see, most of the threat, the concern, has been with the Soviets, but we now have evidence that indicates other countries want chemical weapons.

During the past decade there has been a proliferation of chemical weapons. The Soviets have used them in Afghanistan. Their client forces in Kampuchea and Laos have also used chemical weapons. [Deleted.]

We have also noted continuing allegations of use by the Ethiopians against the Eritreans and allegations that the Libyans are interested in acquiring chemical weapons capability.

It is becoming increasingly apparent that some nations want chemical weapons in their weapons arsenal.

[Deleted.] We will update you on the continuing analysis of Soviet chemical weapons development.

[Deleted.]

We will start off with the Soviet update.

STATEMENT OF ROBERT OMASTA, DEFENSE INTELLIGENCE AGENCY

Mr. **Omasta**. Mr. Chairman, in the Soviet Union there are several major depots contain strategic reserves for bulk agent and filled munitions. [Deleted.]

Concerning chemical production, there are [deleted] production facilities in the Soviet-Warsaw Pact that have been suspected of producing chemical warfare agent.

[Deleted] go back to World War II are in Volgograd and [deleted].

[Deleted] in Shikhany where the [deleted] chemical proving ground is within the Soviet Union.

[Deleted.]

In the technical support area construction efforts created over the past year show that the Soviets alre continuing to pour money into their CW effort.

[Deleted.]

Sir, this concludes my briefing.

STATEMENT OF CAPT. SYLVIA COPELAND, DEFENSE INTELLIGENCE AGENCY

Captain **Copeland**. [Deleted.]

This concludes my briefing.

Dr. **Gold**. [Deleted.] We are talking about major production facilities [deleted].

This is not a trivial capability that they are talking about.

Senator **Quayle**. What are we going to do about Third World countries?

Dr. **Gold**. The emphasis still is on the multilateral negotiations. The bilaterals would be a complement to that. The multilateral is still the major focus and primarily for the reason you said. It is not just a bilateral problem. It is a multilateral problem.

So, this treaty is in the Conference on Disarmament. The bilaterals would be special United States-Soviet discussions which would complement the multilaterals and work out special problems that the United States and Soviet Union might have.

Senator **Quayle**. What countries now have the capability to manufacture CW?

Do we have a list of them?

Dr. **Wagner**. You said capability. That includes almost every industrial country.

Senator **Quayle**. How many produce or have stockpiles?

Mr. **Gasbarri**. [Deleted.]

Senator **Quayle**. What about South Korea?

Mr. **Gasbarri**. [Deleted.]

Dr. **Gold**. [Deleted.]

General **Klein**. [Deleted.]

Senator **Quayle**. [Deleted.]

General **Klein**. [Deleted.]

Dr. **Wagner**. What about Libya?

Senator **Quayle**. Does Libya have the capability?

Mr. **Gasbarri**. [Deleted.]

Senator **Quayle**. Do they have stockpiles?

Mr. **Gasbarri**. [Deleted.]

Senator **Quayle**. Syria?

Mr. **Gasbarri**. Sir?

Senator **Quayle**. Any indication that Syria has ever used this?

Mr. **Gasbarri**. [Deleted.]

Dr. **Wagner**. That is all we have.

Senator **Quayle**. There will be questions for the record.

Thank you very much.

[Questions submitted for the hearing record follow:]

Questions Submitted by Senator John Warner

BIGEYE BOMB PRODUCTION

Senator **Warner**. Dr. Gold, are all the elements of proposed production readiness program keyed to an initial operational capability date, presuming subsequent congressional approval of production and additional funds?

Dr. **Gold**. Yes; if additional funds are provided in fiscal year 1986, the first 155mm binary rounds could be available in the fall of 1986 and the first Bigeye bombs could be available in late 1987.

Senator **Warner**. Dr. Gold, is there any element of the production readiness request that constitutes more of a "long pole" on the way to production than the others?

Dr. **Gold**. The "longest pole" is the Bigeye bomb metal parts fabrication facility. It would be installed at the Marquardt Company, Van Nuys, CA, at a cost of $16.7 million.

Senator **Warner**. Dr. Gold, there were reports in the press last year which suggested that the Bigeye program was experiencing technical difficulties. Have these been resolved and, if so, what has been done to resolve them?

Dr. **Gold**. Yes; the problem has been resolved. A Bigeye technical status report has been included with my statement.

Senator **Warner**. General Kroesen, in your very sobering study, you conclude that [deleted]. You point further to other shortfalls, such as training and planning for chemical warfare. What would you propose that we do to redress the situation as you see it?

General **Kroesen**. First, it should be clearly understood that our study assumed that new binary chemical weapons were not produced and thus not available as a deterrent. We evaluated the existing US/NATO chemical retaliatory capability and all the currently planned protective improvements. Our assessment was that protective improvements alone, without complementary retaliatory improvements, would not constitute a deterrent. Further, it was our assessment that operating in a chemical protective posture is and will be so debilitating that protection alone cannot deter. Thus our major recommendation would be to reestablish a credible retaliatory capability, that is, an ability to deliver chemical agents on enemy forces, installations, and facilities [deleted].

Senator **Warner**. Would you comment on what it would mean for our negotiating efforts in Geneva if the Congress failed to fund the binary chemical modernization program?

Mr. **Emery**. In our view, the modernization program is necessary to provide an effective deterrent capability until an effective agreement is reached. It would also provide an incentive for the Soviets to negotiate seriously toward such an agreement. Failure to proceed with the modernization program would deny us that important element of leverage.

Senator **Warner**. Does our current draft treaty address the area of biological weapons—like Soviet experimentation with and potential use of recombinant DNA?

Mr. **Emery**. Our chemical weapons treaty proposal does not address biological weapons since the 1972 Biological and Toxin Weapons Convention (BWC) already contains a comprehensive prohibition on biological and toxin weapons. The BWC clearly bans the use of recombinant DNA techniques for developing or producing such weapons. Unfortunately, the verification and compliance provisions are seriously inadequate. We support a Swedish effort to remedy this important deficiency.

Senator **Warner**. Are there provisions in the draft treaty language regarding challenge on-site inspections to protect against unwarranted instrusion into sensitive military activities that are unrelated to chemical weapons? (For example, what is to prevent a Soviet challenge to activities underway in facilities dedicated to Stealth technology?)

Mr. **Emery**. Under Article X of the U.S. treaty proposal, the United States could inspect any military or government-owned or controlled facility in the Soviet Union or elsewhere. The Soviets would have the same right to automatic inspection of analogous U.S. facilities. This pledge to an "open invitation" for inspections "anytime, anywhere" with unimpeded access was made after consideration of the risks and benefits. We made it because we cannot achieve with national technical means the confidence we need that could detect cheating; such openness is indispensible to an effective chemical weapons ban. Uncertainty about compliance would breed suspicion, undermine the treaty, and thereby set in motion the undoing of this important arms control measure. We clearly recognized that the Soviets might challenge a facility unrelated to chemical weapons, for example, one involved in the "Stealth" program. It was decided that the United States should take this risk in view of the enormous value of an effective chemical weapons ban.

In concluding that an approach along all the lines of our "open invitation" approach is the *sine qua non* of an effective CW ban, we have signaled our acceptance of some degree of risk to other aspects of our national security. We believe that if states really wish to create an international environment in which all chemical weapons are really eliminated then they must be willing to take some security risks to achieve the enormous benefits of such a ban. Furthermore, we believe that those risks can be managed and the verification regime we have proposed does so through its triggering mechanism, the structure of the fact-finding panel and the manner of operation of the international inspectorate itself. Also, we are confident that frivolous demands for inspection, such as "fishing expeditions", will be substantially deterred by the reciprocal nature of the "anywhere, anytime" access provision.

Senator **Quayle**. The subcommittee is adjourned.

[Whereupon, at 12:45 p.m., the subcommittee adjourned, subject to call of the Chair.]

DEPARTMENT OF DEFENSE AUTHORIZATION FOR APPROPRIATIONS FOR FISCAL YEAR 1985

TUESDAY, MAY 1, 1984

U.S. SENATE,
SUBCOMMITTEE ON STRATEGIC AND
THEATER NUCLEAR FORCES,
COMMITTEE ON ARMED SERVICES,
Washington, DC.

THEATER NUCLEAR FORCE ISSUES

The subcommittee met in executive session, pursuant to notice, at 10:03 a.m., in room 232A, Russell Senate Office Building, Senator John W. Warner (chairman) presiding.

Members present: Senators Warner, Nunn, and Exon.

Staff present: Arnold L. Punaro, staff director for the minority; Robert F. Bott, William E. Hoehn, Jr., George K. Johnson, Jr., James C. Smith III, professional staff members; Douglas R. Graham, research assistant, and Karen A. Love, staff assistant.

Also present: Les Brownlee, assistant to Senator Warner; Bernard R. Toon, assistant to Senator Quayle; Francis J. Sullivan, assistant to Senator Stennis; and Jeffrey B. Subko, assistant to Senator Exon.

OPENING STATEMENT BY SENATOR JOHN W. WARNER, CHAIRMAN

Senator WARNER. The subcommittee convenes this morning in executive session to receive testimony on theater nuclear forces in review of S. 2414, the fiscal year 1985 Department of Defense authorization bill.

This hearing will provide the record upon which we base our recommendations for this important element of our overall nuclear deterrent.

I am pleased to welcome back our witnesses: Dr. Richard Wagner, Assistant to the Secretary of Defense (Atomic Energy), and Mr. Frank J. Gaffney, Deputy Assistant Secretary (Strategic and Theater Nuclear Forces Policy).

Dr. Wagner, you may introduce your supporting witnesses as we get underway.

I am advised by counsel that the committee will receive a classified report today from the Department of Defense on the nuclear posture of NATO, as directed by the 1984 Department of Defense Authorization Act.

Since the issues that were directed to be addressed by this report are most germane to the programs before us this morning, I invite the panel to comment on this report and its findings in any way that you see fit.

STATEMENT OF HON. RICHARD L. WAGNER, ASSISTANT TO THE SECRETARY OF DEFENSE (ATOMIC ENERGY)

Dr. **Wagner**. Thank you, Mr. Chairman.

Before I start with my presentation, let me introduce Mr. Gaffney, whom you know is now the Deputy Assistant Secretary of Defense for Strategic and Theater Nuclear Forces.

Senator **Warner**. And he is well qualified to hold that position.

Dr. **Wagner**. Particularly well.

Gen. Sidney Davis, representing the Army; Gen. Bob Durkin, representing the Air Force, and Gen. Randy Peat, representing the Office of the Joint Chiefs of Staff.

I will briefly go through some background information and then ask General Davis to give some particular focus on the Army weapon systems, in particular short-range weapon systems.

Mr. Chairman, I believe the issue for the theater forces modernization in the context of this year's budget is not so much how much or how many weapons we should build, but whether we should proceed qualitatively with modernization programs, in particular the 155-millimeter artillery shell, funding for which was denied last year in the authorization bill.

Senator **Warner**. I had a brief meeting with Senator Nunn earlier this morning in preparation for this hearing. He assured me that he would be here.

Dr. **Wagner**. Most of the first part of my presentation is on the overall rationale and background for the theater forces. We will come to the short-range forces and the artillery shell in particular later.

Senator **Warner**. To accommodate Senator Nunn, whenever he arrives, we will go right into that issue.

In the meantime, let us proceed as you have laid out your program.

Dr. **Wagner**. Much of what I will say today will be a briefing version and a paraphrasing of a report which is being submitted to the Congress today, on the nuclear posture of NATO.

It was required by the 1984 authorization bill for the Department of Defense. It is due today and it is being submitted today.

Mr. Gaffney has been the guiding spirit behind the preparation of that report and he is here to talk about it in more detail than my briefing will be able to cover.

Senator **Warner**. There is not to be an unclassified version, Mr. Gaffney?

Mr. **Gaffney**. Senator, we discussed that with your staff yesterday. We looked at the possibility of developing from the executive summary an unclassifed version that tried to capture the highlights of it. That can be done.

Frankly, as we looked at the material that would have to be deleted to sanitize the report, it was our judgment that absent strong feelings on your part, which were not expressed by the staff, that we would refrain from producing such a report because the real meat, in fact most of the salient points, found their way into the classified material.

A summary of the rest of that, it was our feeling, would not be a terribly helpful document. But we can do that if you desire.

Senator **Warner**. I would urge that it be done to the extent the Department feels it can divulge that information because bear in mind we have to deal with the public and our colleagues.

Mr. **Gaffney**. Yes, sir.

[Additional information follows:]

Senator **Warner**. Can an unclassified version of the Report to Congress on the nuclear posture of NATO be developed?

Mr. **Gaffney**. We have examined the possibility of developing an unclassified version, but have concluded that we would not be able to summarize the main points, conclusions, and recommendations in an unclassified format. We feel that an unclassified version would be of little use in describing our views on the nuclear posture of the Alliance.

Dr. **Wagner**. Mr. Chairman, I have a brief statement to submit for the record in addition to the briefing.

I also have an unclassified version of that short statement which I can provide for your staff for use in whatever way you would like.

[The statement of Dr. Wagner follows:]

PREPARED STATEMENT BY DR. RICHARD L. WAGNER, JR., ASSISTANT TO THE SECRETARY OF DEFENSE FOR ATOMIC ENERGY

NONSTRATEGIC NUCLEAR FORCES (NSNF)

The overriding purpose of our Armed Forces is to deter aggression. Through a triad of forces consisting of conventional, nonstrategic nuclear and strategic nuclear forces, we seek to convince potential aggressors, such as the Soviet Union, that aggression would initiate a sequence of events which would involve risks out of all proportion to any advantages that might be gained. Should deterrence fail, however, the triad must be so structured that it is militarily effective enough to cause an early political decision by the aggessor to cease fighting and to withdraw.

The nonstrategic nuclear forces are, of course, a vital element of that triad, contributing as they do the NATO strategy of flexible response, which was established in 1967 and is, if anything, more valid today considering the greater diversity and capability of the Warsaw Pact threat. This strategy is based on having available a spectrum of military forces: a strong conventional defense, options for escalation with tactical nuclear weapons, and linkage to strategic nuclear forces. It is not economically nor practically feasible for NATO to match the overwhelming conventional strength of the Warsaw Pact. NSNF counter this WP advantage by providing the means to prevent or defeat an attack that takes advantage of superior strength. But, they are not intended to substitute nuclear capability for conventional force shortfalls. Certainly, we must have conventional forces strong enough to effectively raise the nuclear threshold and to provide the potential for stopping an initial conventional attack. We must, therefore, continue to commit resources to the improvement of our conventional forces and the development of new and more effective conventional weapons. On the other hand, such commitment to conventional improvements does not mean that we should do away with our nuclear forces. NATO ministers, in the "Montebello Decision" of October 1983, have set a goal of reducing the number of nuclear warheads in Europe [deleted] over the next several years and have requested SACEUR to provide the mix and composition. Accordingly, SHAPE is engaged in a nuclear weapon requirement study, planned for completion in early 1985. Numbers and types of nuclear weapons required in Europe will then be known.

Integrated to ministers' decision to reduce numbers of nuclear weapons in Europe was an endorsement of a modernization program for them, and of measures to improve their safety, security, and survivability, which will also be enhanced by modernization.

In response to this endorsement, our current planning for modernization includes, of course, the ongoing deployments of PII and GLCM (unless progress in arms control curtails that deployment), a new tactical bomb, the B-61, the new 155mm and 8-

inch nuclear artillery shells, possibly a modernized mid-range replacement or modification to Lance, and perhaps a standoff air delivered weapon. NATO ministers endorsed all these improvements.

Turning now to the short range nuclear forces—mainly, the 8-inch and 155mm AFAP's and the Lance—we believe they have important and in some regards unique values in the spectrum of deterrence; they provide escalation and escalation control options, they force dispersal and this ineffectiveness of pact conventional forces, and they have good survivability.

To be effective, flexible response requires a near-continuum of possible counters to the many possible military situations which could arise, so that the enemy cannot create one in which NATO's response is either ineffective or too risky from the point of view of escalation. We require options for escalation with tactical nuclear weapons—both to deter escalation and to control it—if conventional defense fails. In particular:

A. SNF provide NATO with response options which are low on the escalation spectrum. Should an attack occur, and our conventional forces can not stop the attack, NATO through its SNF has the option of escalating to a level sufficient to stop the attack without resorting either to use of longer range TNF, should the military and political situation preclude that, or to a strategic strike.

B. SNF deter possible Soviet first use of their battlefield nuclear weapons, which could be extremely effective in a military sense and—absent a similar response capability—could place a difficult escalation burden on NATO. This is especially important in light of the recent large Soviet deployment of several kinds of nuclear artillery, including three types of tube artillery and modernized battlefield missile systems. We do not need to match this deployment in order to deter its use, we believe, but we do not need to partly redress the growing imbalance by a vigorous modernization program.

The presence of a potent SNF on the battlefield causes an attacker to choose between dispersing his forces in order to avoid presenting a lucrative nuclear target or risking catastrophic destruction by keeping them massed. An attacker who prefers to mass, but who has been forced to disperse has his forces deployed in a way that reduces their effectiveness and slows the momentum of the attack. This situation, in turn, causes a recalculation of the probability of successful attack, and the reduction of that probability is what will cause an aggressor to be deterred.

C. Because of the large numbers of cannon, and the inherent survivability of tube artillery on the battlefield because of hardness, mobility and low signature, nuclear cannon artillery can be an especially survivable component of the TNF. This will be even more true as our ongoing survivability program improves the survivability of the nuclear projectiles themselves. Survivability will be especially important in the future as numbers of TNF are reduced and as the Soviets continue to improve their non-nuclear and nuclear means for attacking NATOs nuclear forces.

SACEUR will have completed his assessment of how the [deleted] weapons agreed to at Montebello will be apportioned by early 1985. In the meantime it is important to continue modernization and to provide flexibility to meet SACEUR's apportionment. The current budget provides this flexibility by preserving options for the out years which can accommodate a range of possible outcomes of SACEUR's study, but production covered by the fiscal year 85 budget request—almost solely for weapons provided in fiscal years 85 and 86—is very unlikely to exceed even low-range results of the study in any category. The only system not provided for in the budget request is the new 155MM AFAP, the W82, for which production funding was denied by Congress in fiscal year 84.

We believe that the W82 is needed. General Rogers has repeatedly endorsed its production. A 155MM capability is needed because most of NATOs cannon are on that caliber, and because it complements the 8-inch well. The modernized 155MM projectile is needed because of the current round's deficiencies in range, safety, security, reliability and yield, and because the new generation of 155MM cannon being acquired will not fire the old round, since the allies counted on our new development.

Dr. Wagner. Let me go to the briefing then.

NATO STRATEGY THROUGH THE YEARS

CHART 1

EARLY DAYS
- RESTORE BALANCE OF POWER THROUGH CONVENTIONAL FORCES

1952
- MILITARY COMMITTEE STRATEGY MC 14/1:
  - "LISBON GOAL:" ESTABLISH 96 ACTIVE AND RESERVE DIVISIONS
  - PROVED UNACHIEVABLE: ECONOMIC AND POLITICAL
  - INEFFECTIVE AGAINST SOVIET NUCLEAR BUILD-UP

1957
- MILITARY COMMITTEE DOCUMENT MC 14/2:
  - THIN CONVENTIONAL "TRIP WIRE" THAT TRIGGERED MASSIVE U.S. NUCLEAR RESPONSE
  - WORKED ONLY AS LONG AS U.S. HAD CLEAR NUCLEAR SUPERIORITY AND SOVIET UNION HAD NO TACTICAL NUCLEAR FORCES

1967
- MILITARY COMMITTEE DOCUMENT MC 14/3:
  - DETERRENCE AND FLEXIBLE RESPONSE BASED ON "SPECTRUM" OF MILITARY FORCES: CONVENTIONAL, TNF, STRATEGIC NUCLEAR FORCES

1983
- ENDORSED MC 14/3 IN "MONTEBELLO DECISION"

My first chart is a brief summary of the history of the way NATO views their defense responsibilities and in particular the balance between relying on conventional weapons and relying on nuclear weapons.

The first major point here was in 1952 the military committee issued document MC 14/1, the intention of which was to establish 96 Active and Reserve divisions to counter the continuing threat since World War II of the Soviet conventional forces.

After some realistic reappraisal, it was clear that the alliance at that time was unable to do that and 5 years later, the position had swung in an almost diametrically opposite direction to a trip-wire concept with the same conventional or forward defense, penetration of which would essentially automatically trigger a massive nuclear response.

That was an appropriate position for that time when the United States had a near monopoly on nuclear capability However 10 years later it was clear that that was both a dangerous position and one which could not offer the long term sustained support of the alliance and, therefore in 1967 the military committee prepared document MC 14/3 which talked about a flexible response based on a continuum of conventional theater forces, theater nuclear forces of various kinds and strategic nuclear forces.

That document, MC 14/3 and the idea of flexible response behind it had comprised, quite appropriately we believed, the basis for

NATO's policy. It was endorsed in the Montebello decision of last fall.

That chart summarizes in some way the history of relying on nuclear weapons to take the place to some extent of the alliance's ability to match the Warsaw Pact conventional buildup.

That inability is forced on the alliance I believe because of some fundamental realities. One is geographic, the fact the ocean splits the alliance in half, half of the resources are west of the Atlantic, and the other is cultural realities.

It is difficult in an alliance like ours to maintain the consensus required to have a militarized society. A part of that is the fact that it simply costs more to provide a soldier in the West than it does in the Soviet Union.

For a number of reasons like that, therefore, NATO has over the years tended to rely on nuclear weapons as a backup in one form or another to the conventional forces. However, since 1967, with the transition from trip wire to flexible response, there has been a realization that we must do a thorough and responsible job on the conventional forces and reduce the reliance on nuclear forces.

That philosophy is reflected in the numbers of U.S. weapons stationed in NATO shown in this chart [chart deleted].

MC 14/3 was promulgated in 1967 just about at the peak of this curve of buildup of nuclear weapons. You can see since that time there have been a number of decisions taken to reduce the number of nuclear weapons in NATO, the most recent reflected in this dotted line, the reduction from essentially today's level down to about the [deleted] level of the Montebello decision.

Along with that, and in just the last few years, we have seen the reduction shown in that chart [chart deleted] reflected in a change in the proportion of the weapons in NATO, the proportion changing from a heavy reliance on short-range systems to a stronger reliance on longer range systems which have more utility, both from a political point of view and, as our ability to consider striking deeper targets increases, in increased military capability as well.

So, what you see here, 5 years ago the proportion of short-range nuclear forces, SNF, is quite large. It has now been reduced substantially.

As you know, the Montebello decision remitted to General Rogers the responsibility to make a proposal to the Ministers for how the [deleted] number would be proportioned. I will address some possibilities for that later on.

Our belief is that General Rogers, and in fact he has said so, will probably apportion the mix in such a way that by the late eighties, you will see a further reduced reliance on short-range forces.

Another thing that has been going on during this period, however—all I have talked about so far is numbers and the proportion as a function of range—there have been modernization programs going on on both sides of the border.

The Warsaw Pact has had a vigorous modernization program, the NATO alliance has a somewhat less vigorous modernization program. I believe that that is a dangerous thing for the alliance.

I think the Soviets are deterred by a number of things, but a very strong factor in their view of us, which is what their response would be in a crisis when we want to deter them, is the level of technology in our forces.

I think that the Soviet view is, and in fact there is intelligence that bears on this point, that the West's technology is something in the nature of a talisman or charm. It is there, it has a property which can protect us and threaten them. That is the essence of deterrence.

Absent that kind of symbolic commitment to deterrence that comes from modernizing our forces, I think over the years we may come to appear less competent, less capable of deterring than in fact we really are.

I think, therefore, that is why it is so important for us to press forward with a modernization program.

Now, in the late seventies the alliance was beginning to address the need to modernize the nuclear forces which has essentially not been addressed, not been updated, since they were first introduced in the late fifties and early sixties.

There were studies going on toward that end of deciding exactly how the modernization should proceed when that work was essentially overtaken by the necessity to address a qualitatively new threat, the SS-20.

As you know, in 1979 with the decision to proceed toward deployment of the GLCM and Pershing II, the last several years of the alliance's attention on modernization has been taken up by that very difficult problem.

That is now beginning to be behind us and the larger agenda of the overall modernization of the forces can now begin to be undertaken again.

The Montebello decision was a culmination of some work that had been going on really without cease since the late seventies, but was somewhat overshadowed by the LRINF problem.

That modernization program, the overall modernization program, is also, I believe to some extent, tainted by the unpleasant memory of the enhanced radiation weapon problem that was created during the 1977-78 period when we offered those weapons as part of the modernization program, the Germans accepted them, and then we withdrew the offer.

That unfortunate episode tainted the overall process of modernization and it took us, I believe, until about the time of the Montebello decision to do the homework and rebuild the confidence and rebuild the understanding to be able to address the overall problem of modernization.

The Montebello report does that and does it very effectively. The Ministers committed to a broad modernization in the context of a reduction to [deleted] weapons across the spectrum of forces from the short-range systems, the artillery systems, through some recommendations for [deleted] systems, including perhaps an [deleted] system, and with substantial emphasis on improving the safety, security and, perhaps more importantly, the survivability of the forces.

It is very difficult to improve the safety, security, and survivability without at the same time modernizing the weapon systems themselves.

The necessity for this across-the-board modernization is shown in the next sequence of charts that I have which shows by category of weapons in 1983 and the projection into 1990 the comparisons between the NATO posture and the Warsaw Pact posture.

This chart [chart deleted] starts at the short range of the spectrum with artillery tubes. You can see here on the left-hand side of the vertical line the NATO posture, the 155-millimeter howitzer and the 8-inch or 203-millimeter howitzer with a somewhat larger number of tubes here on the pact's side and in fact three types of systems instead of two.

I should say that on the NATO side of the chart these shaded regions are the key, the chart says nuclear dedicated. That really is tied not so much to dedicated cannon, but to the number of warheads that we have.

In fact, just recently [deleted] which is a laudable objective and one which substantially enhances the survivability of that part of the force, as General Davis will amplify later.

Senator WARNER. What is the range of the respective weapons?

Dr. WAGNER. My next chart [chart deleted] shows that. If I may go down to the 1990 projection, however, it shows an even larger buildup of the Warsaw Pact and somewhat of an increase on our part on the 155 millimeter, but one of the themes that has run through the last decade or so is the increasing Soviet reliance, apparent reliance, on short-range systems and in particular artillery.

The range of these systems today, the comparisons of the ranges are shown here. On the right-hand side one sees the Soviet system and on the left-hand side the NATO systems.

The most disturbing development in short-range distance recently has been the introduction by the Soviets of this 152-millimeter system which has a range nearly [deleted].

Senator WARNER. I have been studying this chart. Let me see the arrows.

One firing by the Warsaw Pact and this is our response. Our arrows go from left to right and theirs from right to left. They are comparable now?

Dr. WAGNER. Comparable now with the exception of this system which was introduced just in the last 2 or 3 years as a nuclear-capable system on the part of the Soviets.

Again, in the 8-inch category we are out-ranged today by some [deleted] percent and that again would be rectified if we were to continue to produce and deploy the W–79, the modernized 8-inch shell, which has a range out close to [deleted] kilometers.

The capability which is essentially unmatched and which I believe we do not need to match is this shorter range mortar which appears to be essentially a nuclear-only system on the part of the Soviets and may well have been provided in order to provide somewhat more yield for their short-range systems.

It is a little hard to say why they felt the need to deploy that system.

Senator WARNER. Are you going to cover what would be the damage of a single shell?

Dr. WAGNER. General Davis will cover that in a few minutes.

On the other component of the nuclear artillery, the missile system [chart deleted] we see here on our side the Lance and a few old Honest Johns remaining, facing on the Soviet side a Frog system, which stands for free rocket over ground, and a modernized version of that, the SS-21, with essentially the same proportions continuing out into the early nineties.

We feel the need, and in fact it was endorsed by the *Montebello* decision, to upgrade in this particular category perhaps by a new or [deleted] to give longer range which is needed to compensate for the longer range of the Soviet systems, and I will show you that again in just a minute.

To go to the somewhat longer range missiles, here we see [chart deleted] the comparisons on the left-hand side in the ranges out to include the Pershing II and the GLCM, very small numbers on our part.

Today the Pershing IA's and the few Pershing II's that are coming in and the few GLCM's in 1990, perhaps a [deleted] the full deployment of Pershing II's shown here and full deployment of GLCM's, but in all cases dramatically overbalanced by the Soviet capability.

These are not the SS-20's up here. These are shorter range missiles than the SS-20's. The SS-20's are shown here with a projection of continuing deployment of the SS-20's, but you can see this tremendous imbalance in this particular category of range.

This line at the very bottom is our projection, which we see in their research and development programs, of a deployment of a Soviet cruise missile, itself.

As you know, the Soviets have a pattern of essentially continuing the research and development for systems like this in their design bureaus and of 5 or 6 or 8 years putting out a new version which has some improvements in a kind of continuing upgrade program.

The SS-23 shown here, the SS-22 and on my previous chart the SS-21, are the current generation.

By the late eighties we would expect to see another generation of those systems.

Senator WARNER. Looking at 1983 now, what is our retaliatory posture there?

Dr. WAGNER. In this particular case we have perhaps—the scale on this is a little hard to read—a [deleted] Pershing IA's, at the end of this year perhaps [deleted] Pershing II's, and again [deleted] of GLCM's facing [deleted] Soviet systems in the Scud, SS-4, SS-22 and SS-12.

Senator WARNER. That imbalance did not come to pass overnight. So, our planners thought that through and apparently decided years ago not to try to develop comparable——

Dr. WAGNER. It did not come to pass overnight, but in fact it has been a rather substantial buildup during the 1970's on the part of the Soviets, both in numbers and in the replacement of the older Frogs and Scuds with the new systems.

It is largely in response to both this situation and the imbalance in the shorter-range systems, the artillery systems, that we were beginning to address this across-the-board modernization in the late seventies which was, I have to say, to some extent interrupted by the need to respond to the qualitatively new threat of the SS-20.

So, we were in sense preoccupied during the last 5 years or so with the Pershing and GLCM deployments in response to the SS-20.

I believe, Mr. Chairman, that we are, as your question implies, years behind in this modernization program and we have got to face up to it, I believe the opportunity to face up to it is provided now by the Montebello decision in which the allies have endorsed the modernization program in just these categories, perhaps not in numbers, but in the things that we can do without increasing numbers, and that is systems that are modern, that are technologically more survivable and more capable.

Senator **Warner**. What is the yield of the Scud?

Dr. **Wagner**. The Scud CEP I think may be listed on my next chart [chart deleted]. It is [deleted] meters today. It is [deleted] meters right there.

The SCUD is going out of the inventory and is being replaced by a somewhat longer-range SS-23 with [deleted] CEP, perhaps a [deleted] and in fact for some of these systems, the SS-21 here and probably the SS-23, there appears to be a version with some kind of [deleted] that would get down to the roughly [deleted] meter accuracy capability.

That is a particularly worrisome development for two reasons.

One is that for the first time it may give them the capability of attacking targets like our [deleted] attacking those sites effectively with [deleted].

The other concern is that those accuracies be used with [deleted] to carry out a very [deleted] using a nuclear warhead.

So, that kind of development is quite worrisome.

Let me go on finally, then, to the long-range INF systems, the SS-20 is shown in the range chart here [chart deleted] the SS-20 with the ground-launched missile, the GLCM here, and down here the Pershing II.

Again, you can see that the SS-20 is substantially longer range than either of the things we have deployed in response to it.

We think we do not need the longer range, but the SS-20 is clearly a very worrisome system.

Senator **Warner**. What is the retaliatory capability against the SS-20?

Dr. **Wagner**. We have essentially no retaliatory capability in the sense of being able to attack the SS-20 itself if it were to stand back out of range, and this chart implies that it could.

However, we feel that the ability of the Pershing II and GLCM to reach into the western military districts of the Soviet Union, not to Moscow but in the western military districts is a substantial deterrent because we could for the first time really effectively with the Pershing and GLCM threaten their mobilization base, their logistics, their supply routes.

Senator **Warner**. For conventional forces?

Dr. **Wagner**. Yes, sir.

Senator **Warner**. But the SS-20 could hold hostage every site, every military target in the entire NATO area?

Dr. **Wagner**. They do. I was going to come to that point.

Senator **Warner**. Maybe I am getting ahead.

Dr. **Wagner**. No, sir. I think it is a good question.

Let me put on the chart I was going to put on in the next few minutes and then come back to this series.

NONSTRATEGIC NUCLEAR FORCES [NSNF] ARE A VITAL PART OF OUR STRATEGY OF DETERRENCE

Strong conventional force; Escalation option and linkage through theater nuclear forces; and Strategic nuclear forces.

NATO's posture for years, ever since MC 14/3 was promulgated, was to have a strong conventional force, the capability of escalation in a number of ways, both controlled escalation and to deliberately escalate ours through a continuum of forces based in the theater, but then a coupling, a linkage, to the strategic nuclear forces.

Senator WARNER. What is your definition of "strategic nuclear" in that third category?

Dr. WAGNER. The Conus-based system.

Senator WARNER. The whole Conus-based system and the intercontinental range system. So, our inability to attack the SS-20 itself in retaliation is to some extent compensated for, I believe not probably fully in both a military and political sense, compensated for by the linkage to this strategic system.

At that point the whole continental United States is involved in the NATO conflict?

Dr. WAGNER. That is right.

Let me, if I may, finish up the catalog of modernization by looking at the aircraft systems, the dual capable aircraft, [DCA].

Again, here you see the similar kinds of imbalances [chart deleted]. In 1983, of these systems with the nuclear-dedicated capability shown in the dark shaded areas and on the Soviet side a comparable number of systems, but with what we believe to be a substantially greater portion dedicated to a nuclear role, and in 1990 some modernization on our part, for instance, the increased reliance on the F-16 and increased buildup of the Tornado and a little bit more on the Jaguar, but with a substantial introduction of new systems on the part of the Soviets probably continuing with their old reliables, the Badger and Blinder and the Backfire, but adding other nuclear-capable systems down here at the bottom of the chart.

So, in this category as well are systems which can range all the way from close to the line of contact between troops out for long ranges, again a substantial imbalance.

So, the imbalance in the numbers as shown in these last few charts, as you have pointed out, Mr. Chairman, the disparities in ranges of the systems.

The final thing to point out is the disparity in the ages of the systems. The systems that will actually be in the inventory as of 1990 I have shown in these several categories with the age of the system arranged along the bottom here as of 1990.

For instance, by 1990 the SS-20 up here will be probably 12 years old or so.

That chart [chart deleted] is in fact just what I have said it is; it is a snapshot as of 1990.

What it doesn't show is that the Soviets are currently replacing these systems out here—the Frog, the Scud, and the SS-4—with substantially newer systems, the SS-21, SS-23, SS-22, the SS-20, over here a new system that has not yet been given a designator, and the ground-launched cruise missiles.

If I remove those systems, which are essentially nearly out of their inventory in 1990, and do the same thing for us, and that will be the case we hope for the 8-inch artillery shell, my chart of ages looks more like that.

What you will see is that the Soviets—with one exception, the SS-12, which is also being removed from their inventory, but not quite as rapidly—the Soviet systems cluster down in this age range of around 10 years.

With two and possibly a third system I have not seen here, we would expect to see another version of the short-range systems come along in those years with a few systems having just been recently introduced.

Mr. Chairman, the charts that I have shown so far show you the details of the ranges and ages of the systems that we and the Soviets have.

On our side let me simply summarize those then with this chart [chart deleted] that shows the current systems, the short-range systems here, the intermediate-range and the long-range systems with air-delivered bombs covering the whole spectrum of ranges and these two defensive systems.

By the late eighties we will expect to see some systems retired, [deleted] these two systems down here with perhaps [deleted] left, some question about what [deleted] will evolve into.

So, the modernization programs that we are talking about are, as you know, then the Pershing and GLCM which are underway, a possible deployment of a [deleted] system either in this range category or perhaps over here and the artillery shell, and the updating of our stockpile of bombs itself and the possibility, probably not until the early to mid-nineties of a deployment of a [deleted].

The particular numbers of those systems today are in these categories. I wanted to show this chart [chart deleted] to distinguish between the system deployed in Europe and the total inventory of the systems that we have of those types.

The total inventory is shown in the left-hand two columns and the numbers deployed in Europe shown in the right-hand columns.

As you know, the Montebello decision calls for a total of [deleted] which proportion SACEUR will determine during about the next year.

I have taken the liberty here of making a few guesses as to the way the proportions will turn out.

I will guess there will be [deleted].

So, we are heading into a situation then where because of [deleted] it will be more important for us to be sure of modernizing the forces.

Now, before I stop and turn to General Davis to talk about the characteristics of the weapons in somewhat more detail, there is another element to this story which is the development of a kind of detailed logic for exactly how these forces would be deployed, how they will be used, exactly how they deter and how they fit in with the conventional and possibly with operations on the battlefield, how would they be used, what would the Soviets responses be and NATO responses and how they will all play out.

We have thought a lot about that. It is a difficult subject to think about for several reasons. One is simply that war itself and how the war would go is a murky affair. It is made doubly murky by the fact that we have never had experience with a conventional war in which our adversary had an arsenal of which nuclear weapons were present, whether they were used or simply for their deterrence.

We fortunately have had no experience in that world.

Finally, it is a little difficult to lay out a single line, logical structure for the usage of these forces because we have a doctrine of flexible response. We deliberately designed a posture in which we are not going to tip our hands to the Soviets as to exactly when we will use the weapons. We want to be able to cover any of the many contingencies that might arise on the battlefield.

I see us here as being in a situation which, if I can extend the way Winston Churchill talked about planning for alliance cooperation in the early days of World War II, he said something like, "We can either have very detailed plans or we can muddle through or, better than either, we can plan to muddle through."

By planning to muddle through, he meant not laying out in detail exactly how things will go and building an inflexibility in your response, but providing yourself with the capability, the tools, so that however things eventuate, you have a capability to respond.

That is basically what our posture is and what the philosophy behind our posture is.

Having laid out those qualifications, let me proceed to try to summarize our view of how the nuclear weapons fit on the battlefield in a few charts within the framework of flexible response and the concommitant ideas of forward defense where because of the rather shallow depth that the alliance has in terms of territory, we must effect a defense as far forward as we can.

Within the Framework of Flexible Response, NSNF Can:
- Partly offset Warsaw Pact conventional preponderance by—
    - Possibility of use any time, forcing dispersal of pact forces
    - Threat of use as a last resort
- And thus deter conventional attack by reducing Soviet estimates of success
- Deter Soviet first use (—NSNF survivability improvements required)

Within that framework we have essentially two or possibly three things that nonstrategic forces can do.

Senator Warner. Let me interrupt with one question.

Suppose we start a war. We celebrate the 40th anniversary of D-Day on June 6. Use that as a benchmark date when the war you are about to describe will kick off. You are in General Rogers' position.

How would you generalize the disparity of that asymmetry that you face on the first day looking at those charts that you just put up?

Dr. Wagner. I couldn't characterize it by talking only about nuclear disparity. I would have to characterize in terms of a conventional disparity as well.

There is a significant imbalance in both types of weapons. General Rogers, himself, has many times, of course, said that with the current conventional imbalance he would expect to be able to hold the Soviets for a matter of days, a week or perhaps at best a couple weeks, perhaps holding them rather close to the border, but then at some point being faced with the reinforcement from the Soviet rear echelons resulting in one or probably several breakthroughs, at that point, to use his phrase, he would have to turn to his political leaders for guidance and request the use of nuclear weapons.

Exactly what the circumstances would be and what the type of nuclear response would be at that time is a thing that he has been, I think, very careful not to say and it is because one would have to understand in more detail than I can describe or I think anyone can accurately predict what the circumstances are, how rapidly the Soviets are advancing across, what fraction of the total front, what one's intelligence says about their ability to continue to sustain that advance, have they thrown essentially all of their reserve forces in or are they maintaining another sequence of echelon?

That is why we feel it is so important to maintain a capability across the whole spectrum from an ability to use short-range weapons only, the longer-range weapons only, or the short- and long-range weapons together and in a number of different types of strike patterns.

Senator **Warner**. I agree with that.

I come back to the question. He reaches that threshold where he recognizes conventional defense retaliatory strength can no longer stop the advances. He calls his political leaders and says it is time to play the nuclear card.

What is the disparity in that nuclear card?

Dr. **Wagner**. At that time the disparity would be as is shown in a number of charts.

Senator **Warner**. I am trying to get you to generalize it.

Dr. **Wagner**. It is a substantial disparity. The disparity in numbers is large, but I don't believe we have to match the Soviets in numbers in order to effect the kind of deterrence we want.

My belief about the use of nuclear weapons and how they deter is that the Soviets want to be able to pursue a conventional campaign through to success if they can.

I believe that the imbalance is severe, but it is not a hopeless situation. I think that we do not have to have the same number of weapons that the Soviets have in order to create the kind of deterrence that we need.

What we need to have is weapons of types and of characteristics which, when the Soviets look at them and do their calculations of the risk as opposed to gain, they can see that our weapons can survive and can be used effectively against them in sufficent numbers to influence the conventional attack.

I say "influence" because it can either force them to disperse or actually destroy units.

Now, the exact number that we need to have in order to do that is what General Rogers is studying now, but I am convinced that it is not the same number that the Soviets have.

I personally do not know why they have as many nuclear weapons as they have. I think it may very well be along the lines of what we know to be their propensity for using their military posture as a political weapon, as a weapon of terror, than because of any calculation of how many they would need in a campaign.

Their military and industrial complex, as you know, is one that operates at a level of effort. They have spent already the resources needed to build the factories and the design institutes and, therefore, once the machine is running, it can continue to run.

I see no rational basis for a possible analysis of what they might have done that says we need 8,000, 10,000, 12,000, 13,000, 15,000 weapons in Europe.

So, I don't think we need to match that number.

Senator **Warner**. But they have them.

Dr. **Wagner**. They have them and they will continue to modernize them.

Senator **Warner**. There is enormous disparity.

Does anyone have numbers? It is [deleted].

Dr. **Wagner**. It is [deleted]. We can add up the numbers on the chart. [Deleted.]

Senator **Warner**. The charts you showed, in my humble judgment, a very substantial disadvantage to the NATO force.

I am just wondering if in fact the Supreme Commander of NATO, recognizing that, is really going to use his nuclear card on the basis of those odds?

Dr. **Wagner**. Let me go on with the next chart that I have which addresses at least the context of your question. I think there are three things that our forces can do.

They partially offset the conventional imbalance by facing the Soviets with the prospect at any time, not just when we are about to lose catastrophically, but at any time, we might use the weapons. That forces dispersal and a number of other hindrances on the pursuit of the conventional campaign on the part of the Soviets.

Second, is the actual threat of the use as a last resort when we are faced with a catastrophe.

The combination of those two we believe deters conventional attack.

Finally, deterring Soviet first use itself in whatever circumstances they might meet.

Again, I do not believe that to accomplish any of those three goals we need to match them in numbers.

I think we must present them with weapon systems which would work, which would survive and which would produce very large damage, but that doesn't mean matching them in numbers.

I am afraid it does mean, in fact, I am convinced it does mean, modernizing what we have. Some of that view on my part is conditioned by my belief that the Soviets would prefer to win the war conventionally.

The risks are clearly greater if the war becomes nuclear, especially if we maintain the capability to escalate in a number of different dimensions, both numbers of weapons and ranges of weapons that we use, so as to provide the prospect of a continual escalation into the strategic forces.

Senator **Warner**. Your hypothesis, that they would prefer to win the war conventionally, begs the question that they think we won't use the first nuke.

If they won it conventionally, that would mean we withheld the use of the nuclear card?

Mr. **Wagner**. I think that they will not view it as the proper course to use nuclear weapons themselves first.

Now, we have to deter that because if we leave that avenue open and that is a possibility, we wouldn't want to leave it open to them, but if they see that we could compensate for a catastrophic conventional loss by NATO first use of nuclear weapons, I think that gives them real pause because their response would be to use nuclear weapons themselves, no doubt, in response and I suspect that they see that as creating a circumstance in which the conventional campaign comes to a halt, partly because of the devastating effect of nuclear weapons, but more generally because no one has ever operated with nuclear weapons on a conventional battlefield before, and we know that there are effects, fallout, tree blow-down, fires, that will have probably a devastating and unpredictable effect on a well-oiled, nicely progressing conventional advance.

Senator **Warner**. Also on the political institutions of the various countries involved?

Dr. **Wagner**. Absolutely.

Senator **Warner**. Assuming there is some measure of communication left.

Mr. Gaffney?

STATEMENT OF FRANK J. GAFFNEY, DEPUTY ASSISTANT SECRETARY OF DEFENSE (STRATEGIC AND THEATER NUCLEAR FORCES POLICY)

Mr. **Gaffney**. Senator, if I might try to make the point in a slightly different way.

I think you are putting your finger on a very important element of the deterrence equation. While Richard was unwilling to speculate on it, my own feeling is that the Soviet purpose here in putting into the field the large number of weapons they have and in trying to acquire the kinds of weapons, the quality of weapons—they have, as indicated by Dr. Wagner, both of a nuclear nature and with conventional applications—is to allow them to attempt to execute very effective surgical attacks.

Senator **Warner**. Using what weapons?

Mr. **Gaffney**. Either low-yield nuclear weapons or very precise high-yield conventional weapons, so that either by dint of the awesome number of nuclear weapons they have deployed——

Senator **Warner**. Let me interrupt to acquaint Senator Nunn with where we are.

We have gone through the various charts indicating the relative order of battle in nuclear weapons between NATO and the Soviets. We have determined that there is a very substantial [deleted] advantage in terms of numbers of weapons, types and ranges, in the hands of the Soviets.

The question I posed is, recognizing that, would the supreme commander of NATO utilize the nuclear card against the overwhelming conventional attack, recognizing that card in and of itself has a disadvantage of [deleted] to one?

Senator **Nunn**. That is a good question.

Adding to that, it is my understanding all the war games you play show [deleted].

Mr. GAFFNEY. I would prefer not to comment on the war game situation because we are not being precise which games you are talking about. I have participated in games where that is not necessarily the case. But I would rather not generalize. This is fundamentally a philosophical question rather than a hardware question.

My response would be that I think the Soviets are intent, first of all, upon trying to achieve their goals without war at all.

If they can do so by sheer political intimidation, that would be satisfactory. Failing that, should push come to shove, I think they are intent upon achieving them by use of conventional weapons.

What I was postulating was a scenario in which they could use the enormous conventional forces they have which Dr. Wagner has mentioned have threatened Europe since the Second World War, either without nuclear weapons, holding them in abeyance so as to deter NATO's use of nuclear weapons, or with their selected use. Their purpose here would be to limit either NATO's ability to release its own nuclear force, or to execute with nuclear forces so to try to eliminate NATO's retaliatory capability.

Senator WARNER. Would you go through that one more time?

Mr. GAFFNEY. It is essentially their purposes to achieve their goals through a nonnuclear, conventional war. I would postulate, that either they are acquiring and deploying the enormous numbers of nuclear weapons either to deter NATO from using its smaller nuclear force in response to a conventional attack or to use in an extremely limited fashion. In the latter case they would take advantage of limitations that we have built into our own systems either of a political nature or for security purposes to limit the damage from our retaliatory nuclear attack. Moreover, by retaining in reserve most of their nuclear weapons of a theater nature, as well as strategic nature, they would continue to deter a nuclear response by NATO.

So, coming back to your point, Mr. Chairman, my feeling is that there is no question about it; the political and military leaders of the alliance would be faced with a very grim situation, indeed, if deterrence failed in the first instance.

I think what we are postulating here is a series of steps aimed at complicating the Soviet ability to calculate with confidence that they could precipitate hostilities and benefit from doing so. We are attempting to modernize our forces, to make them more survivable, to improve the ability of political authorities and military authorities to utilize those forces and to ensure that there is no break in the continuum between the smallest, shortest range tactical systems and the long range intercontinental systems such that Soviet uncertainties will be maximized. We want to do this lest they, in fact begin to think nuclear is the way to go or even that conventional war is the way to go.

Dr. WAGNER. Mr. Chairman, can I address Senator Nunn's point for just a moment?

The war games showed after nuclear weapons are used [deleted].

Senator NUNN. By both sides?

Dr. WAGNER. [Deleted.]

Senator NUNN. I am thinking in terms of short-range systems, not strategic.

Senator WARNER. We have basically three steps of weapons.

One, your field tactical artillery, then the longer range theater missile and then the intercontinental missile.

Dr. **Wagner**. What we are after here is deterrence. It is thinking about these things in perspective. It may well be true that after a two-sided exchange, [deleted].

[Deleted.]

Senator **Warner**. Suppose they take an SS-20 and drop it [deleted] and say "OK, in 24 hours the rest will go?"

Dr. **Wagner**. In that kind of more gradual escalation we need to do a number of things.

[Deleted.]

That is a problem to be fixed. That is part of the nuclear modernization we are talking about. It is improved in a number of different ways.

For instance, in the area of the artillery it is improved by simply giving the artillery longer range so that they are not as outgunned in the sense of range by the counterpart system, but there are dozens of additional improvements.

I think those kinds of improvements have to go hand in hand with modernizing weapon systems themselves. A lot of them are operational improvements. A lot of them have to do with being able to move the weapons into a more survivable posture during the crisis period before the shooting starts or just as the shooting starts.

The modernization we are talking about is not simply weapon systems. Modernization says a lot of different things.

Senator **Warner**. I would like to ask General Peat what kind of results your war games have [deleted].

STATEMENT OF BRIG. GEN. RANDALL D. PEAT, U.S. AIR FORCE

General **Peat**. Generally the damage done on both sides is very significant. [Deleted.]

I think we are leaving out, as we talk about this, the other part of the equation which is [deleted].

Senator **Nunn**. Haven't we reached the point where they have come pretty close to deterring our first use of nuclear weapons in response to a conventional attack?

Our doctrine for years was that we were better off escalating even though both suffer in nuclear war. It seems to me they come close to deterring our first use.

You are talking about a nasty game of chicken without any advantage for escalation on our part.

General **Peat**. We are talking about a massive game of deterrence.

Senator **Nunn**. I am saying once war has started, deterrence has failed.

Obviously, if you deter, you don't have conventional war. I am postulating conventional war has already started and they have gained territory. We have to decide whether to escalate with nuclear weapons.

Would you basically, knowing what you know about it under that situation, that kind of assumption, be in a position to say you would advise the commander in chief to escalate with battlefield nuclear weapons?

General **Peat**. In the total scenario, it is very difficult to postulate how bad we are losing, the multifront we are losing on.

Senator **Nunn**. Take any one you want.

General **Peat**. I would say if we were massively losing across the front, I would recommend an attempt to restore deterrence through first use.

Mr. **Gaffney**. I want to put a small commercial message in here.

If you think the problem you described just now is bad, think about what happens when people say that precisely that same escalation decision is the one you are supposed to make when the Soviets first use chemical weapons.

The idea that that is going to be an even more attractive proposition and more credible deterrence of first use of chemical weapons seems to be even more problematic.

Very valuable work is being done under Dr. Wagner's leadership, both internally in the U.S. Government and in extensive cooperation with the allies, to try to improve measurably the survivability of our theater nuclear forces and our ability to ensure that we can communicate with them and operate them effectively. Those capabilities fundamentally underpin such deterrence value as these forces have.

I commend him very strongly and hope that he will enjoy the full support of this committee as his efforts have been given in the past.

To the extent particularly that you are concerned about the credibility of the deterrent, it really is much, much worse if we do nothing to ensure that such forces as we have today—hopefully modernized forces in the future, but even the forces we have today—hold a credible deterrent to the Soviets such that, going back to my comment a moment ago, as they make that initial calculus of go—no go, they continue to feel they are better off not going.

Senator **Warner**. Not going what?

Mr. **Gaffney**. Not going into a conventional attack or any other sort of attack against Western Europe.

Senator **Nunn**. Isn't it true in our war games and under the general scenario General Rogers posed, once the conventional thrust is started, then we escalate, because we are losing conventionally, to theater nuclear or short range, then they escalate in response to that, isn't it true that at that stage we virtually have no conventional forces left to defend with, whereas they do have substantial conventional forces left, although they have been damaged?

General **Peat**. I have seen it both ways. I have seen it where we have had ample opportunity to reinforce Europe, perhaps 30-day warning.

In some cases [deleted] there is no escalation required. When it does escalate, if we have had an opportunity to get our reinforcements to Europe, the imbalance is not as bad conventionally.

If in fact we face the 72-hours warning kind of scenario, then you are absolutely correct, [deleted].

Senator WARNER. If we have had a 30-day warning, you would advise the President, "Mr. President, we will be relatively worse off than we were before, but nevertheless I advise you to escalate"?

General PEAT. I think both sides will be worse off. It will give both sides pause to wonder what the next step is.

Senator WARNER. Suppose we had the 30-day warning and we are able logistically to bring our conventional forces and narrow the gap in disparity, the Soviets then see the Red Army being ground down with a very strong conventional defensive mode, they may initiate the first use?

General PEAT. Quite true. As a matter of fact, we see that in the doctrine.

Dr. WAGNER. Senator Nunn's dilemma that he posed, and it is a dilemma, and the scenario you just mentioned, Mr. Chairman, both lead you to a position that says improve the conventional forces.

We know that that is the position. I have trouble drawing from that, though, the conclusion we ought not to modernize nuclear.

Senator WARNER. I am not suggesting that.

Senator NUNN. I am not suggesting that either except psychologically you have to pose at some point, after a 20-year history, the question whether by continuing to rely very, very heavily on the short-range tactical systems you, in effect, give the Europeans the kind of excuse they already want anyway, that is, to continue to rely on nuclear weapons rather than wean themselves in some form of conventional defense.

That has been going on since the Schlesinger years and continues to go on. At some point you have to pause and ask: Are we reaching a point of circular reasoning in our modernization of tactical nuclear weapons in the face of what we recognize is pretty close to Soviet deterrence of our first use?

It may not be there, but it is getting closer. Are we really discouraging psychologically the conventional defense that we all agree is important?

If you can present to me a European commitment to a viable conventional defense over a 10-year period, I would feel a lot better about going forward with this program, albeit I would suggest very radical changes in the program itself.

Senator WARNER. I will make one last observation.

Really the function of Congress is to try to make some general prioritization of funds. We are not experts. You spend 365 days a year on this. We dart in and out of this situation from time to time.

I keep coming back to the point that the final deterrent is the intercontinental strategic system. I query then the extent to which we put money in conventional, in theater, taking it away or depriving greater funding of intercontinental strategic, when in fact, that is the thing that is the ultimate deterrent.

Mr. GAFFNEY. I think the feeling of the administration and indeed I think virtually that of every administration since the Second World War, at least since the rejection of the theory of massive retaliation, has been that, to the extent your planners, your military officers, your political authorities have flexibility as a result of investments made in a balanced way across the spectrum of forces, you have a preferable situation to one in which you must ultimately rely exclusively upon your strategic systems for massive retaliation in the event of any and all incursions.

My feeling is that what we have portrayed this morning, what we have talked about in the past, is a concerted effort, indeed an allied effort, to make substantial reductions in NATO's nuclear forces. The movement toward substantially smaller levels of nuclear weapons, indeed far smaller than the levels which existed in 1967 or so, that would be in place in Europe when the Montebello decision is implemented, would be, I think, as much incentive as one could hope to give the allies to take prudent steps to increase their investment in and their reliance upon a conventional capability. Short of saying that you are not going to do anything in the nuclear area, that you are going to attrit your forces simply by obsolescence, I don't think there is anything more compelling that we can do. Frankly, I don't think the latter is a course of action that the Congress or the executive branch could responsibly advocate.

Senator NUNN. It is also difficult to see spending billions and billions of dollars in this area and depriving conventional forces of the funding needed to provide a viable defense.

As Senator Warner says, all these things are tradeoffs. That is what we have to decide in view of the budget situation.

Let me ask another question.

Do you mind going back?

Dr. WAGNER. I think we are on the nub of the issue now. So, I would like to pursue it.

Senator NUNN. On the question of having these forces in Europe for deterrence or first use, if necessary.

Senator WARNER. When you say "these"?

Senator NUNN. Short-range tactical systems.

What sense is it to produce 8 inch with ER components [deleted].

We all know if we had 30-days warning, which is about the best we could hope for, [deleted] in that kind of situation.

I think that would cause a political breach in the alliance right at the beginning of any kind of necessary mobilization.

I don't understand that at all. That doesn't make sense at all.

I say that as one who led the fight on the floor of the Senate to go with the neutron weapon or enhanced radiation weapon.

We have to face reality. To me it is like throwing money down the drain. If you don't get the ER components of the 8 inch and get it over there, they will not add to deterrence.

I would like somebody to explain to me what looks like an absolutely untenable, illogical, absurd position and it goes against the direct advice of General Rogers.

Dr. WAGNER. Due to a sweetheart use of adversity, DOE has put us in a position where [deleted].

Senator NUNN. We did something right because of [deleted].

Dr. WAGNER. I say it with a little bit of chagrin. However, [deleted].

Senator NUNN. [Deleted.]

Dr. WAGNER. [Deleted.]

[Deleted.]

We recognize the dilemma [deleted].

[Deleted.]

Now, you remember that the Montebello decision [deleted].

[Deleted.]

That has been our intent. [Deleted] that is the situation today. We are working in the direction you suggest.

Senator **Nunn**. What is keeping you from making the decision? I can't find anybody who disagrees [deleted]. Everybody tells me they agree with it.

Dr. **Wagner**. We have been a little loathe [deleted].

What I am really doing is putting a little better face than I know exists on what has been a bureaucratic problem.

Mr. **Gaffney**. I think the movement is in the right direction, Senator.

Senator **Nunn**. When you get your program together and it begins to make some sense, I think you will have a lot more support for it up here.

Mr. **Gaffney**. That is one of the most compelling arguments in favor of the approach, apart from the military considerations, which weighs upon our internal deliberations.

Dr. **Wagner**. If I may, I would like to come back and show one chart [chart deleted] that I showed before you came in which is just what we have available for modernization.

The systems in the boxes are the ones that we will have in the late eighties. We have and we are moving in the direction of taking the battle farther to the east with the longer range systems, and, in fact, with the improvement in the [deleted] which I can come back to in a minute.

That is another extension of a capability toward longer range systems, effectiveness of the longer range systems, and a reduced reliance on short-range systems.

Now, the thing that we would really like to do is put together something either as a new version of [deleted].

Both of those developments I suspect are well out in the nineties. The things we have available today beyond the Pershing and GLCM and the improved bomb is the artillery shell.

So, rather than let the better be the enemy of the good, we are, in fact, proposing to go ahead with that modernization. [Deleted.]

The numbers of weapons that are being funded in the 1985 budget will not be wasted even if General Rogers or we all collectively decide to cut the number of artillery shells [deleted] say, and I would not urge that we go that far, and I doubt he would suggest that—even if that were the decision, however, we would continue to build W-79's this year and could modernize the 155 without having wasted production.

Mr. Chairman, what we would like to do now is to turn to General Davis for a discussion on the artillery shells themselves. I would propose we do that now.

STATEMENT OF BRIG. GEN. SIDNEY DAVIS

General **Davis**. Mr. Chairman, Senator Exon, the last time I saw you, sir, was in a Preshing location in Europe.

Senator **Warner**. You were commander of the site.

General **Davis**. I was commander of the brigade. I wish I was back there.

I would like to submit my statement for the record.

Last year in the joint conference report of the DOD authorization, Congress gave us very specific guidance to terminate the W-82 program.

In our analysis of how best to do it, as good solidiers, we went out and determined that we had to take advantage of the $300 million of RDT&E already sunk into it and develop a limited technical data package that we could put on the shelf in the event the decision was reversed at a later time.

As good soldiers, though, I believe we have a professional responsibility to come back to the Congress and ask you to reconsider the production of the W-82.

General Rogers, General Vessey, and all the military leaders have substantiated the need for the 155.

Also the *Montebello* decision in 1983 recognized the need for [deleted].

There are many reasons why we need the modernized 155 and you have heard them all. I want to hit two of them.

No. 1, [deleted].

No. 2, [deleted].

When the *Montebello* decision which brings us down to [deleted] is implemented in the mid-1990's NATO will have on its soil the smallest number of nuclear weapons in 20 years.

Senator WARNER. Repeat that again, please.

General DAVIS. When the *Montebello* decision is implemented in the 1990's, NATO will have on its soil the smallest number of nuclear weapons in 20 years.

Senator WARNER. That is numbers of warheads or launchers, which?

General DAVIS. Warheads.

Senator WARNER. But one warhead may be 10 times more effective than the one it replaces.

General DAVIS. The P-II is a lot more accurate.

Mr. GAFFNEY. I can't say that similar reductions have been made in the Soviet forces.

General DAVIS. When I say the current 155 mm AFAP W-48 round [deleted], I would like to show you a comparison.

[Chart deleted.]

As you see, the range is only about [deleted].

The W-48 is already [deleted]. If you decide to give us the W-82, it will be another [deleted] before we can have that round on the ground over there. Then it will be [deleted] years old.

The old round is [deleted] for the new NATO weapon systems and you can expect destruction of only about [deleted] percent of, say, an array of Soviet tanks.

Let me show you the W-82, sir [chart deleted]. As you can see, there are [deleted].

The [deleted] when you look at tank troops.

It will also be [deleted] for the common modernization that is going on in Europe today. Additionally, you can see the expected destruction increases significantly.

Senator WARNER. What is the circumference?

General DAVIS. I have another chart to show you [chart deleted]. If you look at the [deleted] of them with the W-48.

[Deleted.] If you go to the [deleted].

Now, this target is optimized for the W-48.

Senator WARNER. Again, that diameter is what?

General DAVIS. That goes out about [deleted] and then goes back to about [deleted].

Senator WARNER. Meters?

General DAVIS. Yes, sir.

Senator WARNER. [Deleted.] Then you don't know what the secondary effects are?

General DAVIS. Yes, sir, you can compute what it would be.

Senator WARNER. Suppose the wind is blowing in a direction toward the other tanks, to what extent would it debilitate their use?

General DAVIS. It would contaminate the area.

Senator WARNER. Suppose the wind is blowing directly toward your own forces?

General DAVIS. Bad news, sir. Hopefully, we wouldn't fire under these conditions because all our target analysis considers wind and fallout and everything else. We would have a safety factor.

Senator WARNER. How long would it take for the fallout to disperse if there is no wind?

General DAVIS. Sir, it would not go out very far to begin with. [Deleted.]

Senator WARNER. I understand. We are stuck with this in inventory now. I am just trying to get the operation.

General DAVIS. I don't know what the fallout would be.

Dr. WAGNER. In most of these weapons the burst is intended to be high enough so that there is essentially no immediate fallout. It is an airburst, the ground is not swept up in any great amount.

So, the worst concern is not so much fallout in the predictable sense, what we call rainout, the clouds might get caught in a rain ceiling and rain cloud perhaps some distance downwind.

One problem with the old artillery rounds, 155 and 8 inch, is the [deleted].

So, that is another bonus that comes from the modernized round [deleted].

General DAVIS. There is a big discussion on need for short-range nuclear forces. I gather this discussion is appropriate, but when you look at it from the position of the grunt on the front lines, what does that mean?

It means he has been fighting 5 to 7 days and he is getting his lumps and he is looking around for some help. He wants help on the spot to blunt that attack.

The best thing we have is the short-range nuclear round that will go out and hit the enemy. We want to keep it down low. We want to keep the escalation down low.

If we can do that, we at least give the Soviet Union something to think about.

If we don't have that short-range nuclear force, we are out of sight. Give that young soldier down there something with which to hit them on the nose and bloody his nose and if we can blunt the attack, we have something going.

Senator WARNER. How long before he retaliates?

General DAVIS. Sir, what option do we have?

Senator WARNER. I have the utmost compassion with you working on this 365 days a year and I work on it maybe 5 months a year, but think about it 365 days a year. I don't propose to have the answer. It is frightening.

General DAVIS. It is, sir.

Senator WARNER. The greatest function of the Congress is to try to allocate the priorities and the dollars as best we see fit.

They say why do you need the 8 inch and the 155?

[Chart deleted.]

General DAVIS. Look at the targeting situation. Just look at V and VII Corps there, sir. Those are roughly the number of 8-inch units in red that would be dispersed along the V and VII Corps.

That presents a fairly easy targeting situation for the Soviet Union. If you throw in the 155 and say, "Hey, we have a nuclear-capable round here that you had better be concerned about," this is what it looks like.

So, we are giving them something to play with.

Senator WARNER. Give whom something to play with?

General DAVIS. The Soviets something to play with.

We don't have to be fully loaded up, every howitzer with a nuclear round. All we need is the capability out there so that he doesn't know where it is.

Senator WARNER. I have been under fire and my friend, Mr. Exon has been under artillery fire in our own experiences in Korea and World War II. At least there was an element of chance on survivability out there. We could hunker down and take a chance.

General DAVIS. Sir, there is not going to be anyone who wants to go nuclear. That is why we need a deterrent to preclude it.

The question was raised, "What was done in the last 25 or 30 years?" We are at peace anyway. So, we must be doing something right over there, sir.

Senator WARNER. That is right. I am a strong believer in the theory of deterrence. I don't mean to suggest by my question today any lessening of trying to modernize to keep a balance of these forces. At some time we have to pull back from the table and take a broad look at this thing.

Are we trying correctly to prioritize this funding?

Senator EXON. May I ask a question, Mr. Chairman?

Senator WARNER. You may, Senator Exon.

Senator EXON. You indicated the deterrent basically would be to keep the Soviets guessing a little bit.

How would these devices be stored? [Deleted.]

General DAVIS. Right now they are stored [deleted].

Senator EXON. Let me see if I understand you.

What you are telling us is that if we should get into production on these things and get more of them over there, it would be a deterrent?

General DAVIS. [Deleted.]

No. 2, it has to be replaced. [Deleted.]

So, what we need to do is give them something to think about that we have a greatly enhanced capability over there.

Dr. WAGNER. Can I amplify on that, Senator Exon?

Senator EXON. Sure.

Dr. **Wagner.** Mr. Gaffney a moment ago referred to our survivability program. It is an integral part of this whole question of the credibility, to use Senator Nunn's word, the credibility of our theater nuclear forces.

You asked the question about how are they based, are they in just a few sites. Let me take a couple of minutes to describe what we are doing.

- USE OF NUCLEAR WEAPONS IS AN INTEGRAL PART OF SOVIET MILITARY STRATEGY AND REINFORCES SOVIET EMPHASIS ON OFFENSIVE ACTION TO WIN QUICKLY

  "THE ACTIONS OF TROOPS ON THE BATTLEFIELD ARE COORDINATED FIRST OF ALL WITH THE NUCLEAR STRIKES AND ARE DIRECTED TOWARD THE EXPLOITATION OF THE RESULTS."

  A.A. SIDORENKO, 1970

  . . . "NUCLEAR WEAPONS HAVE INCREASINGLY CONFIRMED THE ROLE OF ATTACK AS THE DECISIVE FORM OF MILITARY ACTIONS. . ."

  I. ZAVYALOV, 1970

- SOVIETS WOULD USE NEWLY-FIELDED TACTICAL NUCLEAR WEAPONS IN AN ATTEMPT TO DEFEAT NATO ON THE BATTLEFIELD

  ". . . NUCLEAR WEAPONS, AS THE MAIN MEANS OF DESTRUCTION, SHOULD BE EMPLOYED IN ALL CASES FOR THE DESTRUCTION OF THE MOST IMPORTANT TARGETS.

  . . ENEMY MEANS OF NUCLEAR ATTACK, LARGE CONCENTRATIONS OF TROOPS AND EXPECIALLY ARMORED TROOPS, RESERVES, PARTICULARLY TANK RESERVES, ARTILLERY IN FIRING POSITIONS, BRIDGES, CROSSINGS, CONTROL POSTS AND COMMUNICATIONS CENTERS. . ."

  A.A. SIDORENKO, 1970

The threat is captured in these couple of charts. These are writings from Soviet documents that are now 14 years old, but they are still current in their schools and in their doctrine.

Sidorenko says the actions of troops on the battlefield are coordinated with nuclear strikes. Nuclear weapons have confirmed the role of the attack in a decisive form.

Enemy means of nuclear attack, large concentrations are the targets. Nuclear weapons as the main means of destruction should be employed in all cases for destruction of the most important targets and those are the main means of nuclear attack.

[Deleted.] There are two phases as they see it, the conventional prenuclear phase and [deleted].

Now, today, in fact in peacetime, [deleted]. That is a vulnerable posture. It is a difficult decision on the part of Saceur and the political authorities [deleted].

It is a difficult political decision for Saceur today to make [deleted].

That is the problem that we are addressing with our survivability program.

Let me just give you a feeling for the scope of that program by showing you this chart [chart deleted].

We are moving toward [deleted] which are intrinsically more survivable than the ones we have today and [deleted] we would see a widespread revision of the posture we have had [deleted].

If you look at other things, we are building [deleted].

We are building better tactical warning, we are going to [deleted].

We are intending to move in the direction of using what I call the [deleted] dispersing and hardening the command posts.

We are going to put the aircraft delivered weapons in weapon storage vaults, and improve the survivability of GLCM and Pershing.

The extended range artillery is an important point here for the reasons General Davis gave. We are able to stand the unit back further and artillery is particularly important because it gives him all the aim points that he has to be able to target.

Finally, if we do build a [deleted] or something like that, building in intrinsic features to make them more survivable. Today we have these weapons [deleted]. In the future we will change the mix.

We will go to, if we carry this program through and I believe it is a [deleted].

Let me show you a couple of examples of this weapon storage vault that we are going to be moving toward in the next few years for aircraft weapons.

[Chart deleted.]

Instead of storing weapons [deleted].

So, with that kind of program in addition to the better features in the weapons themselves, we can make them survivable and make them a much more credible threat to the Soviets. That pertains to the artillery shells because there are so many tubes.

If we deploy a 155, we will essentially [deleted] the number of locations that the Soviets have to find, keep track of, and then target when the time comes in order to destroy our nuclear force.

Senator **WARNER**. Let us give General Davis an opportunity to finish.

General **DAVIS**. Just to expand on the point that Dr. Wagner made, [deleted] of those are the 155 variety which presents quite a problem for the Soviets.

My final point, sir, [deleted].

I just came back from 7 years in Germany. [Deleted.]

Senator **WARNER**. You are talking about the Armed Forces or people?

General **DAVIS**. I am talking about the German people. [Deleted.]

Senator **WARNER**. What are your views as to what it was that generated this backfire and stopped the program?

General **DAVIS**. [Deleted.]

Senator **WARNER**. As commander, will you state for the record what you see are the advantages [deleted.]

General **DAVIS**. [Deleted.]

Senator **WARNER**. What is the advantage to your NATO forces [deleted].

General **DAVIS**. The greatest advantage, sir, is that chart that showed [deleted].

Senator WARNER. And also couldn't you in a more rapid way move in and exploit the ground you have eliminated from your enemy?

General DAVIS. It depends on what are the conditions under which you fire. If you are about to be overrun, you may not be in a posture to push.

Senator EXON. General, you seem to be blaming the Germans for this.

Didn't we back away from that?

General DAVIS. Yes, sir.

Dr. WAGNER. [Deleted.]

General DAVIS. [Deleted.]

[The prepared statement of Gen. Sidney Davis follows:]

PREPARED STATEMENT BY BRIG. GEN. SIDNEY DAVIS, DIRECTOR, NUCLEAR AND CHEMICAL DIRECTORATE, ODCSOPS, HQDA

Mr. Chairman, members of the subcommittee: last year, in the joint conference report on the DOD authorization, the Congress called for termination of the efforts to produce the W-82. The requested RDT&E funds were authorized, but the conference specified that they be used to pay the cost of program termination.

In our analysis of how best to comply with that guidance and still get the most out of the over $300M that had already been sunk in a successful R&D effort, we determined that we should terminate at the point of achieving a limited technical data package (TDP) to put "on the shelf". The Army has, therefore, asked, in this year's budget for $15M in RDT&E funds to accomplish that task. The limited TDP will consist of drawings, some test data, and enough technical design information to give a reasonable assurance that the major weapon components could be successfully manufactured should a production decision be made at some time in the future.

In addition, DOD is, in the context of the congressionally mandated report on tactical nuclear forces, asking you to reconsider your decision of last year and allow the W82 Program to go forward. The SECDEF and SA, as well as your military leaders from General Rogers and General Vessey on down, have all expressed the combat requirements for a modernized 155 nuclear round. Additionally, the high level group report, accepted by the NATO ministers at Montebello in October 1983, also recognized the need for artillery fired atomic projectiles [deleted]. There are many reasons why we need the modernized 155 projectile, all of which have validity. I would like to expand on just two of them [deleted.]

When the Montebello decision, bringing us down to [deleted] is implemented in the mid 1990's, NATO will have on its soil the smallest number of nuclear rounds it has had in 20 years. We are not asking to increase the numbers of 155 rounds in Europe or in our arsenal, but rather asking for a round [deleted].

Why do I say the current round [deleted]. The status of the current 155mm AFAP W-48 is shown here [slide deleted]. It is an aging weapon which produces a [deleted]. With it, we can achieve a maximum range of about [deleted] of useful range forward of our own troops. Moreover, because of its [deleted] and, by the Soviets own calculations, it would be capable of defeating [deleted].

Conversely shown here is the W-82 [deleted]. The difference [deleted] is in [deleted] of the projectile. It can have [deleted]. As is obvious, the W-82 in [deleted] offers significant improvements over the W-48 in all areas. The effects [deleted] are particularly dramatic when viewed graphically as shown here [slide deleted]. I know that Dr. Wagner has already shown you this. Please note that the impact point used here was selected to optimize the effects of the W-48. If the aimpoint was changed to optimize the W-82, one round would [deleted] in the array. I contend, Mr. Chairman, if the awesome decision to fire a 155 nuclear round is made, we should provide our soldiers a round that will do the job. The old one will [deleted] probably only make an aggressor mad.

A last important point that needs to be made on the need for the W-82, concerns the targeting problem [deleted]. Therefore, their job is made easier by concentrating on the [deleted]. A lot easier when one considers that [deleted] of our SRN artillery is 155 [deleted]. As an example, using the two Corps in Europe, if the Soviets only have to be concerned about [deleted] delivery units, their targeting problem looks something like this [slide deleted]. But, if we have a modernized [deleted] in the field as well, that picture changes to this with that many potential targets to consider for retention, location and attack, the Soviet planner is forced with a difficult problem in the allocation of resources—one that could affect the attack decision in the first instance.

If Congress approves a restart of this program during the FY85 cycle, the funding will be of concern. For the DOD to procure the first 100 W-82 rounds in about [deleted]. It would take the [deleted] requested in RDT&E this year, plus about [deleted] in RDT&E over the period FY 86-88. Army procurement would be about [deleted] (FY86-90). The Department of Energy has not fully worked out a new funding line but in the short term to restart the problem they would require about $50M to build production facilities and between [deleted] in operating funds for the first year.

The projected life cycle of the W-48, [deleted]. It has been periodically extended, but it is evident the end if approaching. Even if you should decide to restart the program in FY85, it will be [deleted] before the first round comes off the production line. Gentlemen, I believe that we need to get on with producing the new 155mm round.

I trust, Mr. Chairman and members of the subcommittee, that I have thoroughly explained our need for the 155 W-82 round.

Our other modern nuclear projectile is, as you know, the 8-inch W-79. It is currently in production in the Department of Energy. Indeed, the DOD bought out its portion of the W-79 in FY84. To date, DOD has sunk about $188M in the program and DOE has spent about $885M. The build is about [deleted] projectiles scheduled to be delivered by the end of FY84. It is important that we continue with this program for many of the same reasons cited for modernizing our 155M capability, including that the [deleted]. The W-79 offers, over the current W-33, increased range (18km-29km), flexibility [deleted], and operational responsiveness (preassembled). Potential [deleted] with the W-33 put a further severe operational limitation on the round.

A major issue surrounding the W-79 is its deployment and the retirement of the round it is designed to replace. The currently fielded W-33 contains [deleted]. There is a pressing need to retire these rounds so that the [deleted].

In order that we can meet this schedule, it is essential that we have a viable replacement for the W-33. Therefore, we are currently working the W-79 deployment issues within the DOD to facilitate a smooth retirement/replacement sequence. The total number of rounds needed in Europe has not yet been established, but in the Montebello decision the NATO ministers charged SACEUR to establish European requirements within the [deleted] weapon ceiling that they set. His response is due next year. In the meantime, the bulk of the rounds coming off the production line have been allocated against the non-European CINC requests. Overall numbers and allocations will be readjusted once SACEUR's input is received.

Turning now to the longer range systems, the growing, unilateral threat to NATO epitomized by SS-20 missile deployments led to the 1979 ministerial dual-track decision to modernize longer range intermediate nuclear forces [LRINF] and to concurrently pursue arms control initiatives. This decision resulted in Pershing II [PII] replacing P1A in the Federal Republic of Germany. PII offers increased range, responsiveness and accuracy, resulting in a marked improvement in NATO's nuclear capabilities. The procurement requirements for PII were established by the December 1978 DSARC II and provide the required number to support the existing NATO targeting objectives for both general nuclear response and selected employment planning. When the program is complete there will be 108 operational U.S. launchers.

The nuclear warhead for PII is the W-85. This warhead incorporates enhanced safety and security components, as well as [deleted]. It offers an order of magnitude improvement in accuracy, [deleted]. The planned DOE build for W-85 is [deleted] warheads, of which [deleted] are designed for U.S. PII forces. This [deleted] is composed of: [deleted].

[Deleted.] Even if long lead procurement items are produced and stockpiled. A longer delay can be assumed if these long lead items are not procured. This delay could result in a marked drop in NATO's mid-range nuclear capability as well as increased cost.

Senator EXON. As the chairman referred to earlier, it is not only the strategy that we are involved with here. What is your view as to what might happen if the Dutch turn down the GLCM, what is that going to do? You are not primarily concerned about the politics of the situation, but politics plays a large role.

Could you also give me an estimate of what the cost would be for what you are proposing, Dr. Wagner?

Is there a price tag connected with this over the next 10 or 15 years? What is our cost going to be on this?

Senator **Warner**. For what element?

Dr. **Wagner**. For the survivability program, a lot of those changes are operational. They don't require hardware.

Senator **Exon**. Don't require what?

Dr. **Wagner**. New hardware. But, some of the examples I showed you were of new hardware.

Senator **Exon**. You showed some hardening features that would be new, did you not?

Dr. **Wagner**. Yes. We have not costed the full program. The weapon storage vaults for the Air Force applications, just to give you an example, for the full complement for the NATO air bases would probably run about [deleted].

Senator **Exon**. You mean for all of them?

Dr. **Wagner**. For all of them. Just to do a rough kind of off-the-top-of-my-head kind of calculation, if we were to store every one of the [deleted] weapons in Europe in that kind of mode, the storage arrangement costs perhaps [deleted] per weapon, and so we are talking [deleted] or so.

I suspect that might be on the low side, but spread over a period of years we may be talking a [deleted] dollars, and you buy an awful lot of weapons that wouldn't survive if you had it to begin with.

So, paying for the survivability program seems to me like a good way to spend money.

Senator **Exon**. I can't agree with you on that. It seems to me that if we have something over there that is not survivable, if the Russians were to launch an attack they would take out or attempt to take out whatever we had, so as to protect themselves.

I don't want to get into an argument over the MX missile here, but that has been one of my concerns. How much deterrent do you have with something that could be easily taken out?

I am pleased to see that you address the fact that you think we need some survivability there to make it worthwhile.

Dr. **Wagner**. Yes, sir. We have recognized the need for survivability for the strategic forces for generations now.

The MX is particularly hard, because it is a difficult technical job.

Senator **Exon**. We have not paid much attention in the field.

Dr. **Wagner**. We are beginning to. I think that is a crucial part to getting to modernization of the theater weapons.

Senator **Exon**. What have the Soviets done in this area?

Dr. **Wagner**. For one thing, they have not as bad a problem. They don't have the kind of terrorist threat in the nations where they store their weapons, so they are not so constrained to a peacetime storage mode.

Senator **Exon**. And they have no local opposition to put up with.

Dr. **Wagner**. No local opposition. They can put a storage site anyplace they want to, they can replicate them, they can disperse them. We see them doing the same kinds of things we are proposing to do here, reducing the unique signatures of their missile systems, making them more mobile so that they are harder to find and target.

But I think we have a harder problem than they do in that regard, so we are going to have to work at it harder.

Mr. GAFFNEY. One thing that makes the job that Dr. Wagner has taken on as challenging as it is, is the fact that, in a democracy, what might be called a fundamental incompability—or perceived incompability—exists between survivability, on the one hand, and the ways in which a democratic government wishes to handle nuclear weapons. That is, basically, such governments would like to have them in nice big facilities, with tight security, well guarded and simply left there.

We have a real challenge, therefore, to try to ensure that not only do we get the maximum deterrent value out of these systems, but that we do so, that is, through survivability techniques that are consistent and compatible with the way the host governments are prepared to have them deployed.

Senator EXON. I take it from your testimony that you concur that this [deleted] could be spent over a period of years, but that unless we have the support of the NATO governments for placing them there in their countries we would never be able to deploy them.

In other words, a great deal depends on those governments and likewise on their people?

Dr. WAGNER. Yes, sir. to maintain the basing of the weapon there to begin with and the *Montebello* decision is last year's effort to do that, but I suspect every few years we are going to have to revisit that problem with the allies and revalidate our views.

Senator EXON. Who is going to carry the financing? Will that be the United States or would that be part of the infrastructure of NATO?

Dr. WAGNER. It would be both. Some of the things I think are appropriate for U.S. funding.

For instance, a new weapon system, let us say an improved Lance that is intrinsically more survivable, we build those features into Lance itself and it would be part of the acquisition cost of the system.

A new storage site, hardened or dispersed, would be part of the infrastructure program. We are working with the allies to begin to put together this program that I showed you. We would intend to share the cost with them.

Let me tell you, it will be a difficult job, and I can say that from experience, to get them to share the cost for this kind of program, but I think we are making a little bit of progress.

Senator EXON. How about the Dutch, General?

It would seem to me that if the Dutch back down on the deployment which they are talking about doing, it could go either way. The last I heard is that if a vote was taken today, the cruise missiles wouldn't be there. It is possible, however, that by the time of a vote in June, this could change. If the GLCM's are voted down, it is almost a foregone conclusion that any chance of getting anything like this through will be defeated.

General DAVIS. Sir, I heard you ask General Kroesen the same question the other day. It is really out of my element to even comment.

Senator EXON. I know.

Senator WARNER. I think that is very important that you respond in that way. I encourage witnesses to stay within their sphere of authority.

DEPLOYING GLCM'S IN THE NETHERLANDS

Mr. GAFFNEY. Lest your questioning go unanswered, let me try a hand at it.

I personally have been involved in some of the discussions that the U.S. Government has been having with the Dutch and, indeed, with the other allies involved in the basing of the GLCM and Pershing II.

As you know, the Pershing II is not an issue as far as the Dutch are concerned. That is strictly a German situation. [Deleted.]

I would tend to defer to their assessment of their own internal political situations. My feeling is that while it may seem surprising, this sentiment is probably most acutely felt in the [deleted] because they have not taken any missiles thus far.

[Deleted] we are full-fledged members of the alliance and when we say we will do something, we will stand by it and we will carry through on our commitments." [Deleted.]

I must say that I think that the problem, [deleted].

Interestingly enough, the Gallup poll performed a sampling—I believe within the last month—in which an overwhelming percentage of the population, something like 78 or 80 percent, said they believed the GLCM's would be deployed in the Netherlands and some 60 percent felt that it would be inappropriate to bring down the Government over the execution of this responsibility for deployment.

[Deleted.]

I don't think it is necessarily catastrophic either in respect to the deployment of Pershing II and GLCM or necessarily with respect to the deployment of other systems that the allies have agreed upon.

Senator EXON. I hope you are right. I hope your conclusions are right. I have not seen the Gallup poll that you mentioned in which 78 to 80 percent polled think they would be deployed.

I just have the political sense that Schmidt never did really recover politically when he moved ahead and it was the beginning of the end for him.

It might well be if the Dutch do turn this down, it would have no effect whatsoever next door in Belgium or West Germany or even in England, but I would think that would be a pretty optimistic political decision to assume that nothing would change.

As you say, it is a very delicate balance over there.

Mr. GAFFNEY. I confess it is speculative judgment at this point. I will be happy to try to get you a copy of that poll.

Senator EXON. That would be helpful.

[The information follows:]

Mr. **Gaffney**. We have not yet received a copy of the poll, but we can give you a summary of the results. There were two polls, taken on March 19-20 and March 26-27 for the Dutch Atlantic Commission.

52 percent of the Dutch respondents oppose GLCM deployments, 39 percent support them, and 9 percent are undecided. The young tend to oppose deployments, while their elders tend to support them.

Despite the lack of enthusiasm for deployments, 82 percent believe that GLCM will eventually be stationed in the Netherlands, and 57.5 percent find this situation either "good or acceptable."

66 percent of the respondents say that the Dutch cabinet should not be brought down by Parliament in the event of a positive deployment decision.

Mr. **Gaffney**. I think particularly in the context of the artillery round, a theme which has been interspersed in all our statements today really merits specific attention, especially insofar as people are concerned about having a credible conventional alternative, being able successfully to defeat the Soviet Union or blunt an attack, if you will, by them with conventional forces.

I would submit that even if these artillery systems are never used, the very fact of their existence and deployment, preferably on the ground in Europe, has a marked effect on the way in which the Soviets order of battle is constituted and would be employed.

In other words, as Dr. Wagner or one of the charts has suggested, the very fact that there is a possibility of a short-range nuclear weapon being delivered in a tactical situation drives the Soviet planner to spread his forces out.

If there is anything that is going to give either a current conventional capability or even a modernized conventional system a chance to be effective enough to turn the tide, it is the fact that we have, through the synergisms of these conventional and nuclear forces forced them to disperse, preventing them from—as they otherwise would try to do—to steamroll through our defenses on narrow channels with massive armored forces.

That is a point I think we have not made adequately before. It is one that ought to be borne in mind as we think about it, these nuclear weapons not simply how we use them in war time and what role they would play in the escalation chain, and so on.

Those are important questions and they deserve good answers. But there is this other aspect, the synergism and how do we make our conventional deterrent of maximum effectiveness.

We believe we can do so even without having to use the nuclear forces by virtue of their presence and their credible usefulness. It is a deterrent capability I am not sure we have today.

Senator **Warner**. That is very well expressed.

Dr. **Wagner**. Senator Warner, I had intended to cover that point, but I was afraid we were running out of time.

On that point, let me show three charts to amplify on that point.

Senator **Warner**. At some point I would want a response on where are the Soviets on ER technology?

Dr. **Wagner**. I have looked at that question for years. I am convinced that [deleted].

Senator **Exon**. It seems entirely possible to me in the testimony you have just given that the Soviets may be [deleted].

Dr. **Wagner**. I think that is possible. [Deleted.] In some ways it is more of an [deleted].

[Additional information follows:]

NEUTRON WEAPONS IN THE SOVIET UNION

[Deleted.]

Soviet leader Brezhnev declared to a number of visiting U.S. Senators in mid-November 1978 that the Soviet Union had tested a neutron weapon many years ago.

[Deleted.]

Mr. **Gaffney**. On the other hand, I think the principal calculus that has colored our thinking about Soviet development in this area up to this point has been that they don't face the same offensive armor threat that we do.

Rich made a good point about limitation of the collateral damage. If in fact your purpose is to occupy territory, you want to do that. On the other hand, if the principal value of these systems is the ability to defeat mass armor attacks, that is not the threat with which the Soviets have to preoccupy themselves.

That may be something that affects their feeling. It certainly is not a technical question. [Deleted.]

Senator **Exon**. Go ahead and show your charts.

Dr. **Wagner**. Let me amplify on Frank's point about dispersal.

Here are the NATO forces dispersed in some conventional defensive posture here. It is the Soviet doctrine and borne out by a lot of experience, not just on the part of the Soviets, that if you can mass a 3 or 4 or 5 to one, you can beat defense.

So, here we show [chart deleted] an attacking array of tanks spaced as closely together as they would need to beat this density of defense. [Deleted.]

Senator **Warner**. Do you mean the [deleted].

Dr. **Wagner**. [Deleted.]

You would not want to place that as close to defending troops as shown here whereas [deleted]. But with the virtual effect that Frank Gaffney referred to, to avoid placing their troops in that kind of risk from nuclear attack, the Soviets might in fact disperse them so that they couldn't as effectively be attacked.

In this case it would take [deleted] to produce the same kind of damage. But if they have dispersed their forces that way, they can no longer have confidence in being able to penetrate this sort of defense.

In fact, there is a kind of simple approach to gaming the way massing works on the battlefield. Let me show you this chart [chart deleted].

Along the bottom here is the number of red tanks per square kilometer, [deleted] or something like that.

This is a computerized engagement simulation that shows the relative losses. Above this line here the Reds are losing. Here the Reds are winning because the Blue is losing [deleted] in terms of troops.

This line shows that if the Soviets have a 6 to 1 overall advantage, if they can mass tanks to this point [deleted], there is a 1 to 1, defense is able to hold them off.

[Deleted.]

If you can force them to disperse the tanks from up into this range down in this range here by the threat of nuclear use, then you reduce the loss ratio that they can expect to see to the point where they are not going to have confidence in being able to penetrate.

That is the point that Frank made, that you kind of force this reduction of conventional effectiveness on them by the threat of nuclear capability.

In fact, you can see how this sort of arrangement might lend itself to calculating the number of nuclear weapons you would need to do that which is very different from matching the number they have. That is why I said earlier on I don't think we need to match their numbers.

Mr. GAFFNEY. It comes back to the philosophical question of what does it take to deter? What we are recommending is a synergistic picture consisting of conventional and improved nuclear, that does have the deterrent effect even at lower levels across the board.

Dr. WAGNER. Mr. Chairman, could I take 4 or 5 minutes to summarize?

SS-20 WEAPON SYSTEM

Senator WARNER. We have not really touched on what is the scenario with the SS-20 weapon system.

Dr. WAGNER. With the SS-20?

Senator WARNER. Yes. Did you intend to include that within the context of the theater nuclear operation?

Dr. WAGNER. That is the one that is in the boundaries between the theater and the strategic.

Senator WARNER. We well recognize that, but what are we going to do about it?

Dr. WAGNER. Other than the Pershing and GLCM which again doesn't match it in numbers and doesn't match it in range, but may well provide sufficiency to deterrence because it can attack, you know, with those systems and they do augment the longer range air systems, we can attack [deleted] targets deeper in Eastern Europe or into western Soviet Union.

Mr. GAFFNEY. In which areas some of the SS-20's would be placed.

Senator WARNER. What is your understanding of the operational doctrine that the Soviets are using?

At what point in the unfolding of the scenario do they use them?

Dr. WAGNER. From everything we see, [deleted] and at least in the past the timing would be [deleted].

For that reason, it is important to fix the survivability. So, we see them wanting to pursue the campaign in a conventional way until they have beaten us so badly that we begin to prepare to use nuclear and that is when they will use their nuclear weapons to destroy ours.

Senator WARNER. Looking at their arsenal and their weapon systems today, the battle has been underway, say, 10 days. We are recognizing that our conventional forces have to go in retrograde mode, pull back, and then the decision is to employ or not to employ our nuclear attack, when does the SS-20 come in?

Dr. WAGNER. It is hard for me to say when the SS-20's come in.

Mr. GAFFNEY. [Deleted.]

One of the points about the SS-20 [deleted].

As a result, that makes it very attractive for them to [deleted].

Now, you can say that the SS-21's, SS-22's, SS-23's also have that mobility. I think that the flexibility to use those forces is substantially less.

The SS-20 will retain not only the mobility and usefulness for covering, as you indicated, Mr. Chairman, much of that part of the globe, not only Europe, but much of the other littoral areas of the Soviet Union, but also, if it is off-loaded it is an intercontinental range weapon.

It is very capable and a potent system and one well suited [deleted].

Dr. **Wagner**. [Deleted.]

Senator **Warner**. As Senator Nunn points out, if our use of tactical weapons begins to reverse the tide of battle, the Soviets see we are gaining some advantages, it seems to me that forces them to employ the [deleted] to take out any number of targets.

General **Peat**. They have one organizational problem, Mr. Chairman. [Deleted.]

[Deleted.]

Senator **Warner**. We have to assume their command and control will have coordination. In all my studies of the Soviet Union, the crown jewel is the Red Army, the psychological crown. That has been the army that saved them in modern history.

If they see that being ground to bits by the use of tactical battlefield weapons, at some point they are going to unleash the SS-20's.

I don't know what our response is but our immediate escalation to intercontinental systems.

General **Peat**. I am assuming the Soviets would inasmuch as they believe [deleted].

Senator **Warner**. The use of strategic goes all the way from the artillery shell to our MX theoretically. We have to be more careful in the definition when we use these weapons.

Mr. **Gaffney**. We have capability, too, [deleted].

The Soviets have to anticipate that that kind of [deleted] system would be available for retaliation if we were put at risk.

SYSTEMS UNDER PRODUCTION

Dr. **Wagner**. To summarize, in our program this year we have the following systems being actually produced, the 8-inch shell, the Pershing and GLCM, and the new B-61 bombs. Those are the four systems under production.

We would like to see us continue to move toward production of the 155 shell, but the IOC would not be until about [deleted].

For those four or five systems, I guess we believe that the issue isn't whether or not to modernize, the issue is, how many. In fact, we are building four of them and we believe that we should build the fifth one, the 155.

Therefore, we think the issue is how many. However, General Rogers is in the process of deciding how many.

Our program in terms of our outyear plans for the production all the way through to the end of the decade will provide enough flexibility to accommodate upper end ranges for each system as he works it out.

But in the fiscal 1985 budget, we are not going to overreach what we believe are credible lower outcomes for any system of General Rogers' apportionment of the [deleted].

Let me show you an example of that with a system that—two hearings ago, Senator Nunn, I believe you raised the question about the B-61 bomb.

[Chart deleted.]

B-61 BOMB

Our program for the B-61 bomb is a modernization program, both to provide better military effectiveness and also to build safety and security features into the bomb stockpile.

Now, below this solid black line are systems being built for Navy use and above that line are systems for Air Force use principally in the European theater, but not exclusively.

[Deleted.]

We are building some 50 of those per year. So, you can see that the production during 1985 and 1986 will produce something like the slope along that line and we have a number of years to accommodate the potential reductions.

It is a little hard to see increases, but if that turned out to be General Rogers' recommendation, we are a long ways away from having [deleted].

So, my fundamental point here is that the fiscal 1985 budget for these systems on both the DOD and the DOE budget requests are prudent requests. They give us the flexibility, but they don't overreach what General Rogers might desire.

Senator **WARNER**. I am going to have to leave now. Senator Nunn will continue.

I want to express appreciation for your attendence today. I think we have had a very thorough exploration of the issues.

Dr. **WAGNER**. I want to thank you for your invitation.

Senator **WARNER**. Have we offered our uniformed colleagues an opportunity to make a presentation today?

Dr. **WAGNER**. They had not planned to.

Senator **WARNER**. I am not suggesting that, but I want to make certain we have had adequate opportunity to allow you to cover the points that you wish.

EFFECT OF MASSED THREAT

Senator **NUNN**. Let me ask one question before you go, because this is the key to what I think we ought to be focusing on, on the tradeoff that you and I agree will be necessary at some point.

I understand Dr. Wagner used this chart to show the effect of massed threat. You are talking [deleted]. It looks like the attack is coming here and this is the defensive position; is that right?

Dr. **WAGNER**. Yes.

Senator **NUNN**. From my understanding of the conventional forces we are trying to build, so-called emerging technology is that they are designed to do exactly that.

One of the things that is most disturbing to me is to see, it seems to me, an overlap between the short-range basic nuclear systems.

I understood one of the theories of them was that we would have less reliance on nuclear weapons, but we are going to end up having an enormous budgetary pressure on the new systems while we are funding what appears to be duplication in the nuclear.

Dr. **Wagner**. We are going to be relying less on nuclear systems because we are not going to be having as many of them.

My belief is that if you look at the relative effectiveness, yes, it is true that the emerging technologies are much more effective than they are today and we ought to be pushing them hard.

They are not as effective as nuclear weapons. We ought to have some nuclear weapons, I believe, in every category as the ultimate resource.

Senator **Nunn** [presiding]. It might be more effective than nuclear weapons if they prevent an escalation to nuclear warfare.

Dr. **Wagner**. I think any posture you put together on the conventional side is going to look better with a modern capable nuclear backup.

Senator **Nunn**. What if the nuclear funding squeezes out the conventional?

Dr. **Wagner**. I would hate to see that happening.

Senator **Nunn**. If you make a tradeoff, would you gc for emerging technolgies in nuclear systems or less modernized systems or vice versa?

Dr. **Wagner**. We are doing exactly that. We are going to [deleted]. General Rogers is going to come in with a request for [deleted].

Senator **Nunn**. We are not even going to have that. I really can't understand why it takes us to 1985 to get a report like that.

This thing has been studied for 10 years in NATO. There was a report back in 1975 in NATO.

To have 16 months go by trying to make a decision while we are trying to decide funding priorities is really an inordinate time span. I just don't understand that.

Dr. **Wagner**. I have a little trouble with it myself.

Mr. **Gaffney**. I do, too.

Senator **Nunn**. Does it mean NATO is stonewalling that decision?

Dr. **Wagner**. No, sir, I don't see that at all. I talked to General Rogers about that point and I told him that the absence of that report makes hearings like this difficult for us.

Let me say that he understands the urgency of it. It is a cumbersome process to get the half dozen allies that have to play in this and half dozen commands.

Senator **Nunn**. Is it possible it will be available this spring or early summer?

Dr. **Wagner**. [Deleted.] General Rogers' feeling is that it was not well done and I would concur with that.

It has not been particularly well done in terms of the kind of questions you asked in the overall rationale for a number of years. I think General Rogers wants to be sure that we produced something that, one, has detailed agreement of the alliance or, two, details finer than the *Montebello* report and which addresses the kind of questions you raise about this kind of deterrence compared with the conventional weapons systems adequately.

Senator Nunn. Do you see any reason from your military perspective why it takes so long to make a decision that has been in the mill?

General Peat. I talked to General Rogers about the length of time to produce the report.

His response to me was that he wants it right once and for all. That means he not only has the nations of the alliance to deal with, but also subordinate commanders, some of whom are also non-American.

The initial draft of the report was ready in July 1983 and it is, in fact, having been stationed in SHAPE in NATO, almost a 2-year process to coordinate a difficult document up and down the line.

You have to go almost to the battalion commander to find out what his requirements are, work this back to do the analysis, work it back to the field commander.

It is a very long, difficult problem. We all wish it were much shorter.

Senator Nunn. I think the longer that goes on, the less chance we have of having a serious move in NATO on emerging technology on conventional weapons. I think the two are at odds.

I have great respect for General Rogers, but I think we have almost a schizophrenic posture trying to push both of these concepts at one time and having dealt with the Europeans for 10 years, I think you have to tilt one way or the other.

If you try to ride two horses at one time, I am not saying either/or, I think you have to have both, but I think there has to be a very definite tilt by Americans.

I do not think we have made that tilt. Maybe some in the administration have. Until we make the tilt ourselves, I think trying to get them to really commit to what we are trying to do in the conventional area is going to be impossible. It may be impossible anyway.

Mr. Gaffney. This was the point I was trying to address a moment ago before you left. [Deleted.]

NATO has established a ceiling that is in effect, a unilateral one of [deleted] weapons in Europe. [Deleted.] I would submit that the conventional posture was less grim in many respects than it is today.

Yet that number is the number that we will commit to. We have effectively committed to a political decision and Bernie Rogers will come in and try to make it work from a military point of view. He has said you have to bear this in mind in the report.

[Deleted.]

Senator Nunn. You mean he wants to [deleted].

Mr. Gaffney. I believe most, if not all, of those are going to come out.

Senator Nunn. You have [deleted] to add up to that number. That is a no-win posture. Removing 1,400 that are [deleted] have appreciable effect on the risk.

Mr. Gaffney. The only point I am making is that the alternative to taking them out without replacements is to replace them and keep the levels high including modern, capable systems.

We are making a conscious policy decision not to do that. That seem to me to be a tilt.

Senator **Nunn**. You believe we are going to be able to get Europeans to go along with emerging technology in the conventional area within the next 2 or 3 years?

Mr. **Gaffney**. Senator, I am going to follow the lead of my military colleague and say that is not my brief to make.

Dr. **Wagner**. That is not my opinion. I watched it from the nuclear side, but not so much on the conventional side. I think they will, [deleted].

If I may venture an additional point, I don't see the overwhelming commitment to the nuclear systems that I think you believe is there.

PSYCHOLOGICAL ATTACHMENT FOR NUCLEAR WEAPONS

Senator **Nunn**. I am speaking psychologically. I am not saying they have an overcommitment on modernization. They are reluctant to the modernization issue, but they have a strong psychological attachment for nuclear systems.

I think it is an excuse for not doing what they need to do otherwise.

Dr. **Wagner**. They don't like to spend money. I think they will go along with us some distance on ET, [deleted].

Senator **Nunn**. Let me ask two or three other questions.

Your [deleted] European stockpile for Pershing II's shows [deleted] weapons. I make the assumption that this represents [deleted].

It is my understanding [deleted].

[Deleted.]

Dr. **Wagner**. [Deleted.]

[Deleted.]

So, building beyond [deleted] is the capability of hedging against a couple of different directions that the things might go.

Senator **Nunn**. Wouldn't that assume a low priority in terms of defense priority?

Dr. **Wagner**. I would say it is the lower end.

Senator **Nunn**. What do you need as an [deleted].

Dr. **Wagner**. I think we need [deleted].

Senator **Nunn**. If you don't make reductions, would that be at least a point supported by logic?

Dr. **Wagner**. It is the lower end of the priority system, I would say.

Let us make sure we don't cut out spares for retaining and firing tests. We don't fire live warheads, of course, but the missiles themselves.

I wouldn't want to say we would only want to build [deleted] Pershing missiles.

Senator **Nunn**. How many P-II launchers do we have in Germany?

General **Davis**. [Deleted.]

Mr. **Gaffney**. A consideration—and I am not sure in the great scheme of things it ought to have great weight—a consideration that influences my thinking somewhat is the fact that, in our most recent effort to forge an agreement that the Soviets could accept, at the intermediate range talks, we proposed a global ceiling on longer INF systems.

Attached to it would be a commitment on our part not to deploy the full number that we are allowed to have in Europe, thereby, in effect, making de jure the current plan that we would deploy *x* in Europe—*x* would be smaller than the total number that the Soviets have globally.

The idea of having some additional systems that you are permitted to deploy outside of Europe and maintain the flexibility to deploy them elsewhere should the need arise, seems to me to be at least something that we would want to think about before we would drop it from the budget.

Senator NUNN. Are we going to have enough launchers to accommodate that contingency or will we have more warheads than launchers?

Mr. GAFFNEY. [Deleted.]

Dr. WAGNER. As far as the [deleted] is essentially the same.

So, if we [deleted] as a hedge against these possibilities and it doesn't work out, we can [deleted] in the out years.

Senator NUNN. We talked a few minutes ago about the scenario that could unfold with conventional—conventional and then we go to first use of nuclear weapons and the Soviets try to preempt that United States-NATO first use.

How much warning do the Soviets get of our going nuclear? What are the tipoffs rather than perhaps emergency sessions of parliaments of all NATO and politicians in extreme state of agitation?

Assume they pick that all up, isn't it pretty darn clear when we are going to go nuclear? Don't they have a leadtime to preempt it if they saw fit?

Dr. WAGNER. If you look at time lines, it is [deleted] from request from the using commanders. I think one might cut some of that short because I suspect it is not going to be the using commander that suddenly realizes that he is losing.

I suspect that recognition is going to be apparent at the higher level, but is [deleted] I would say.

Today the fact that those [deleted]. One of the things we need to do is fix that up.

[Deleted.]

I think we could get a considerably better level of contact on that sort of thing. [Deleted.]

[Deleted.]

Senator NUNN. [Deleted.]

Dr. WAGNER. Maybe I should go to General Peat who I think will have a perspective on this, [deleted].

General PEAT. [Deleted.] That is what really determines the usability of the system.

So, in terms of creating a dangerous situation because you would have given the possibility of using weapons to a low-level commander, I think we have a system that will preclude that today.

Senator NUNN. If you were over there in command and seeing your positions overrun by conventional forces, wouldn't you put in your own computer you had better ask for nuclear weapons release before you would have to have it?

General PEAT. [Deleted.]

Senator NUNN. Will that be feasible in any kind of war scenario, [deleted].

[Deleted.]

Dr. WAGNER. The target for the short-range system especially. For the longer-range system I think not.

Senator NUNN. I agree on longer range. That is the exact point I make, on short-range systems. [Deleted.]

I can't see a circumstance under which anybody would ever be able to use it.

General DAVIS. It is based on how much of a penetration you can take, sir, in a given situation. I can suffer a penetration this deep and at that time I will need some help.

The commander is looking in a crystal ball if they come this way. It is a kind of "what if" game.

Senator NUNN. If you are on the front lines, [deleted].

If you don't, [deleted] isn't it?

General DAVIS. No, sir, I think the conventional battle will be fought. If it deteriorates, then the planning has to go out of the window certainly.

Senator NUNN. You would have to get a 30-day warning time situation before you have that, wouldn't you?

General PEAT. [Deleted.]

Senator NUNN. How do you define responsible decisionmaking? Dr. Wagner said [deleted]. Is that within your definition of responsible? What kind of leadtime?

General PEAT. We [deleted] for decisionmaking.

Senator NUNN. You know that far in advance about precisely the message you deliver about release authority? You can see the conventional battle unfolding where you would be able to make that release even for battlefield weapons [deleted].

Dr. WAGNER. You will have perhaps moved backward with your units. So, you are being beaten. The target location is not exactly where you thought, certainly not where it was the day before and probably not exactly where you thought it was going to be the day before, but it can be thought of as being within a reasonable range and your troops will be available.

Senator NUNN. Certainly our battlefield people have authority to move the tubes but [deleted].

Dr. WAGNER. [Deleted.]

Senator NUNN. How close are the [deleted].

Dr. WAGNER. [Deleted.]

Senator NUNN. Plans to move those [deleted].

General DAVIS. Yes, sir.

Senator NUNN. You can move the [deleted].

Dr. WAGNER. [Deleted.]

Senator NUNN. [Deleted.]

Dr. WAGNER. Yes, sir.

Senator NUNN. [Deleted.]

General DAVIS. [Deleted.]

Dr. WAGNER. That is not a trivial decision itself. [Deleted.]

Senator NUNN. [Deleted.]

Dr. WAGNER. That is right.

General PEAT. [Deleted.]

Mr. **Gaffney**. One of the things that Richard's team is working very vigorously on is the ability to prove and make routine such [deleted].

Dr. **Wagner**. One thing we are talking about and there are dozens, what we are doing, the Department of Energy shifts [deleted].

Senator **Nunn**. Right now it would be a problem.

Dr. **Wagner**. I think it would be a bit of a problem today. I am not sure the Soviets would [deleted] today, but it would be a problem.

Senator **Nunn**. Can you do that in peacetime now?

Dr. **Wagner**. [Deleted.]

I think we can do it. We have not done it very much.

General **Davis**. What we normally do, sir, [deleted].

[Deleted.]

Senator **Nunn**. I have other questions. I am sorry I had to be in and out. I had a number of people coming in to see me and I could not avoid it.

I have a thousand people up here from the State of Georgia Chamber of Commerce and each delegation has been by. I apologize for not being here the whole time. The staff has filled me in on that.

I appreciate your being here. I hope we can get a program that makes sense and is a cohesive program, considering our conventional thrust which I am very supportive of.

Mr. **Gaffney**. I think you were not here when we mentioned this. We have provided the 1984 version of the 1975 "Nunn report" right on the date when it was required.

I hope that you will find, if your schedule permits you to look it over—and your staff has already pledged to me they will read it cover to cover promptly—that it provides the kind of comprehensive approach that ensures, I hope to your satisfaction, that we are working these problems. We are thinking about the nuclear issues and the force requirements that flow from them in a comprehensive way that does take into account conventional matters, it takes into account chemical problems, it takes into account the Soviet threat. Moreover, it is a systematic, not a haphazard or pell-mell effort.

Senator **Nunn**. I want to first congratulate you on getting this report over here. I will look forward hopefully to personally reading as much of it as one can digest.

Second, now that I have praised you for getting that report over on time, where is the conventional report that was due on the same day?

Mr. **Gaffney**. I was afraid that point would be brought up. The check is in the mail.

Senator **Nunn**. Are they working that issue, too? Is that under another shop?

Mr. **Gaffney**. It is under another shop. It is, I am told, in the terminal phase.

Senator **Nunn**. What was that last? I didn't hear that.

Mr. **Gaffney**. It may have been a poor choice of words. I just said it is in the terminal phase.

Senator **Nunn**. Whose shop is that in?

Mr. **Gaffney**. One of my counterparts, Read Hamner, who is the Principal Deputy under whom Mr. Perle is coordinating with the research and engineering side of the house.

Senator **Nunn**. Has this report and that report——

Mr. **Gaffney**. We have worked them in a very cooperative manner, indeed, Read Hamner's predecessor Bill Hoehn, who now works for you, was intimately involved in that process. They have simply gotten out of phase because of problems that developed at the tail end of the conventional report.

I am not sure where the problems lie. We felt, and I hope you will not reprimand us for doing so, that we felt it is important to get at least this report to you on time.

Senator **Nunn**. I agree and I appreciate it very much.

I thank all of you for being here. You have been very helpful.

[Questions submitted by members of the Senate Armed Services Strategic and Theater Nuclear Forces Subcommittee follow:]

Questions Submitted by Senator John W. Warner

Senator **Warner**. Would you comment on the operational requirement for [deleted] on the GLCM?

Dr. **Wagner**. [Deleted.]

1985 BUDGET FOR SURVIVABILITY MEASURES

Senator **Warner**. How much is requested in fiscal year 1985 for the survivability measures you describe?

Dr. **Wagner**. The survivability measures describe fall into three time categories for implementations, i.e., now, 1990, 2000. We are currently in the process of defining the survivability program in a quantitative sense. Those measures that can and should be done now are more operational in nature and are not funded as specific improvements, but are funded as part of a general activity—or, the survivability improvement is a natural outgrowth of an improvement for other reasons. The weapon storage vault is such an example. It is being instituted as a security and response improvement, but contributes greatly to the survivability of those warheads stored in such a vault. It is thus impossible to precisely quantify the amount requested in fiscal year 1985 for the improvement in survivability.

PERSHING II'S IN EUROPE

Senator **Warner**. Mr. Gaffney, what steps are being taken to enhance the survivability of our Pershing IIs in Europe?

Mr. **Gaffney**. We have taken several steps to insure that Pershing II is more survivable than Pershing Ia. [Deleted.]

Senator **Warner**. Mr. Gaffney, could you comment on how Soviet use of [deleted].

Mr. **Gaffney**. [Deleted.]

155-MILLIMETER ARTILLERY ROUND (W-82)

Senator **Warner**. Secretary Wagner, let's turn for a moment to the W-82 155-millimeter artillery nuclear round.

In your testimony, you have spoken to the military utility of this round and the problems that it will cause for the Warsaw Pact military planners.

In your view, if this round were built and deployed, what effect would it have on the nuclear threshold in Europe?

Dr. **Wagner**. The primary reason for the fielding of the new W-82 155mm artillery round is one of raising the deterrent value of our theater nuclear forces. If this round contributes to deterrence, and we believe it does so in a significant way, then the nuclear threshold is raised by preventing a Soviet or Warsaw Pact attack. Should the attack occur and hostilities ensue, the new round will contribute to raising the nuclear threshold because it is feared by the Soviets, [deleted]. Because of this, the Soviets may be more reluctant to open a nuclear exchange. [Deleted].

Senator **Warner**. What is the Department's position with regard to whether or not the W-82 will have [deleted] capability?

Dr. **Wagner**. [Deleted.]

Senator **Warner**. What are the prospects for deploying the W-82 [deleted]. Will our NATO allies agree to deployment?

Mr. **Gaffney**. The NATO High Level Group's report on NATO's nonstrategic nuclear forces, approved by NATO Ministers at Montebello, Canada, in October 1983, states that [deleted].

Senator **Warner**. Does it make sense to build the W-82 [deleted].

Mr. **Gaffney**. [Deleted.]

REDUCTION REQUEST FOR PERSHING II PROCUREMENT

Senator **Warner**. Dr. Wagner, could you comment on the impact of the House Armed Services Committee reduction to the request for Pershing II procurement?

Dr. **Wagner**. The House Armed Services Committee recommended a reduction of $100M from the fiscal year 1985 PII budget request of $456M, with an associated quantity reduction of 23 missiles from the 93 missile request. Based on the most recent pricing available, the amount required to procure 70 missiles in fiscal year 1985 is $387M. The HASC mark of $356 would allow for the purchase of only 60 missiles in fiscal year 1985, with an additional $31M required to reach the 70 missile procurement level. The impact of the HASC mark is a 33 missile shortfall in the overall PII program requirement and will result in either a reduced test or reserve missile build. The HASC mark will add another 10 missile decrement to the total 23 missile decrement as specified in both the HASC and SASC.

ADEQUATE PERSHING II FUNDING

Senator **Warner**. General Davis, last year the Congress authorized 95 Pershing II missiles, and for various reasons, only 70 or so can be purchased with the funds authorized and appropriated. Are you confident that the fiscal year 1985 funding request for 93 missiles will be adequate?

General **Davis**. We are confident that the Pershing II fiscal year 1985 funding request for $472.2M is sufficient to purchase 93 missiles because it was based on adjustments that were made in order to purchase the 70 missiles in fiscal year 1984. The Army is considering further adjustments to the Pershing II program and will submit these in the fiscal year 1986 budget.

MONTEBELLO DECISION

Senator **Warner**. Was the Montebello Decision to unilaterally withdraw 1,400 tactical nuclear weapons from NATO based upon the assumption that existing forces would be modernized? Would failure to modernize the 155mm nuclear shell, for example, result in a reevaluation of that decision?

Mr. **Gaffney**. The NATO Ministers also affirmed at Montebello that NATO must undertake the necessary modernization and improvements to maintain a credible deterrent while agreeing to withdraw 1,400 warheads from the European stockpile. [Deleted.] While failure to modernize the 155mm nuclear round would hamper NATO's efforts to provide a credible nuclear deterrent, such failure would not change the Montebello commitment to reduce the stockpile by 1,400 warheads. However, it is important to note that the Montebello Decision recognizes the need to take account at all times of changes to Soviet capabilities during the period of NATO withdrawals.

NUCLEAR, SEA-LAUNCHED CRUISE MISSILES

Senator **Warner**. Dr. Wagner, can you, or any of your supporting witnesses, envision any way to verify a proposal which banned nuclear, sea-launched cruise missiles—particularly if the conventional variants are allowed?

Dr. **Wagner**. Cruise missiles have a number of characteristics that make the verification problem more complex than for ballistic missiles. Their small size facilitates concealment, and, as you note, some have both nuclear and conventional warheads. [Deleted.] These factors present us with a challenging and complex verification problem. There is a delicate interplay between the exact formulation of the arms control measures and associated verification provisions. We are seeking to find the best combination.

THEATER NUCLEAR FORCES

Senator **Warner**. Dr. Wagner, what is the relationship between the nuclear armed Tomahawk land attack missile (TLAM/N), and other elements of our nonstrategic nuclear forces?

What complementary or unique missions would nuclear Tomahawk perform?

Dr. **Wagner**. TLAM/N provides our non-strategic nuclear forces (NSNF) with a mobile, survivable nuclear weapons [deleted].

It will complicate Soviet defense problems [deleted]. TLAM/N will also be used in the nuclear reserve force because of the inherent survivability of its shipborne platform. [Deleted.]

BASIS FOR PERSHING II TOTAL REQUIREMENT

Senator **Warner**. General Davis, what is the basis for the total quantity of [deleted] Pershing II missiles?

General **Davis**. The total procurement of [deleted] missiles can be broken out into four major categories: operational missiles, reserve missiles, operational spares, and test missiles.

There will be [deleted] operational missiles tactically deployed with the 56th Field Artillery brigade in Europe.

Experience factors from the Pershing Ia indicated we would need a package of [deleted] operational readiness floats or spares.

The procurement package of [deleted] reserve missiles covers operational, training or maintenance contingencies.

Finally, there are [deleted] missiles in the 10 year flight test program.

The flight test program includes [deleted] missiles in 1985 for Demonstration and Shakedown Operations (DASO), [deleted] missiles for Operational Tests (OT) conducted by USAREUR in 1986, [deleted] missiles for Follow-On Operational Tests (FOT) which require [deleted] missiles per year for 8 years through 1994, and [deleted] missiles for the Artillery/Ordnance (A/O) firings to support the materiel developer in a "fly before fielding" program for hardware and software improvements.

In summary, of the [deleted] missiles total buy, [deleted] missiles are for tactical employment/operational readiness, and [deleted] are to meet the requirements of the 10 year flight test program.

Questions Submitted by Senator Strom Thurmond

GLCM'S IN THE NETHERLANDS

Senator **Thurmond**. The Dutch have indicated that they may refuse the stationing of ground-launched cruise missiles on their soil until a crisis. What would this do to our deterrent posture?

Answer. The Dutch Government is no longer considering the so-called "crisis deployment" concept for stationing GLCM in the Netherlands.

RELOAD MISSILES

Senator **Thurmond**. How many reload missiles do the Soviets have for their SS-20?

Answer. [Deleted.]

MISSILE TEST FIRINGS

Senator **Thurmond**. In their missile test firings, do the Soviets ever reload and launch an SS-20?

Answer. [Deleted.]

Senator **Thurmond**. Security of our nuclear systems is of serious concern to the Congress. The Air Force conducted a security test about two years ago on a mock ground launched cruise missile site. Army aggressors were used to breach security of the site. As I understand it, the Army was very successful, despite sophisticated electronic surveillance techniques being employed against them. How secure are these (GLCM) sites once they have been deployed to firing locations.

Answer. Considerable effort has gone into making the GLCM flight secure when they arrive at dispersed (firing) locations. Forty-four Security Police provide a defense force around the perimeter of the GLCM positions, while nineteen maintenance personnel provide inner area defense. The security police personnel will be divided into, 1-, 2-, and 4-man teams with radar sensors and motion detectors to aid in detecting covert penetration attempts. The radios for these people will be equipped for near silent use and will be connected to a Site Defense Operation Center (SDOC) for near instantaneous redeployment of forces to any area of conflict. All personnel will be armed with at least M-16 automatic rifles. There will also be an M-60 machine gun mounted on a security police vehicle and a Mark-19 grenade launcher available. We continually test, evaluate, improve, and train security because of the sensitivity of the assets involved. Security requires our greatest attention.

Senator NUNN. The subcommittee is adjourned.

[Whereupon, at 1:10 p.m., the subcommittee adjourned, subject to the call of the Chair.]

DEPARTMENT OF DEFENSE AUTHORIZATION FOR APPROPRIATIONS FOR FISCAL YEAR 1985

FRIDAY, MAY 4, 1984

U.S. SENATE,
SUBCOMMITTEE ON STRATEGIC AND
THEATER NUCLEAR FORCES,
COMMITTEE ON ARMED SERVICES,
Washington, DC.

NAVY'S NUCLEAR PROPULSION PROGRAM

The subcommittee met in executive session, pursuant to notice, at 9:05 a.m., in room SR-222, Russell Senate Office Building, Senator John W. Warner (chairman) presiding.

Present: Senators Warner and Goldwater.

Staff present: Arnold L. Punaro, staff director for the minority; L. Wayne Arny III, Robert F. Bott, William E. Hoehn, Jr., George K. Johnson, Jr., James C. Smith III, professional staff members; Douglas R. Graham, research assistant; and Karen A. Love, staff assistant.

Also present: Gerald J. Smith, assistant to Senator Goldwater; Les Brownlee, assistant to Senator Warner; Francis J. Sullivan, assistant to Senator Stennis; and Jeffrey B. Subko, assistant to Senator Exon.

OPENING STATEMENT BY SENATOR JOHN W. WARNER, CHAIRMAN

Senator WARNER. Admiral McKee, we welcome you this morning to receive your testimony on the subject of naval nuclear propulsion.

As you know, we are in executive session.

You may proceed as you wish.

STATEMENT OF ADM. KINNAIRD R. McKEE, DIRECTOR, OFFICE OF NAVAL NUCLEAR PROPULSION, DEPARTMENT OF ENERGY

Admiral McKEE. I have a prepared statement. If I may, I would like to walk around a bit because I have some things to show you.

The major thrust of our effort in this budget will be the design of the reactor and oversight of the propulsion plant design for the new design attack submarine.

As you know, I have the cradle to grave responsibility for operation of 170 reactors which also includes the operation of our land-based prototype reactor plants. I am a submarine officer, so I have to admit to a certain bias.

I was surprised to read in the Washington Post this morning that submarines apparently are not considered an important program!

Senator GOLDWATER. The funny thing is the editor of that paper happens to be a very highly decorated Navy veteran. He has 10 battle stars.

Admiral McKEE. Most folks don't undertand submarine warfare in this country. It is clear to me they still think of us as commerce raiders from World War II——

[Deleted.]

I want to talk a bit about submarine warfare, to put it into perspective. Here are the things a submarine must be able to do. I think I have used this slide with you before.

[Slide deleted.]

If you build a submarine that will not do these things, there is no point in having it. You want a ship that can operate unsupported in waters controlled by the enemy, conduct offensive and defensive operations and stay close to the enemy's home ports for a long time. They must be able to coordinate with other forces, most important, to be able to survive in the face of intense operations, even when they are greatly outnumbered.

That is guerrilla warfare at sea. That is the way it has always been.

LEVERAGE

Submarines in World War II, which comprised only 2 percent of the U.S. Fleet accounted for 55 percent of the Japanese merchant ships sunk. The German efforts in the Atlantic are well known. Most important, for each German submariner we had to commit 100 men in addition to all the machinery that goes along with an ASW effort.

Senator WARNER. That is a very interesting ratio. I never heard it before.

Admiral McKEE. That is a quote from Admiral of the Fleet Gorshkov of the Soviet Navy; 100 men engaged in ASW for each individual in the submarine.

Senator GOLDWATER. What is the average crew of a submarine?

Admiral McKEE. In World War II it was about 60.

Senator GOLDWATER. That many?

Admiral McKEE. Yes, sir. Anywhere from 40 to 60.

Senator GOLDWATER. Where do you put them?

Admiral McKEE. It was close.

People tend to think in terms of commerce raiding, but ASW is more important.

We are never going to have another war as we have had in the past where we simply open the valve and create enough men and machines to overwhelm them. We have to have, folks like Stonewall Jackson, who understand the importance of leverage.

You will recall one German submarine sank three British cruisers in the early days of World War I. They forced a complete redeployment of the British fleet and led directly to the disappointing results at Jutland. There the British broke off prematurely because they were afraid if they pursued they would run into German submarines.

In the Falklands campaign one British submarine sank one ship and the remaining Argentine ships stayed home because the Argentines didn't know whether there were submarines present or not. That is what submarine warfare does.

Today's submarines are expensive ships, but they possess the ability to influence actions far out of proportion to what you pay for the ship.

Senator GOLDWATER. As a matter of interest, I am trying to think of a way to compare the cost of a submarine with, say, the cost of a cruiser.

Admiral MCKEE. It is about the same in today's world.

Senator GOLDWATER. In dollars and cents?

Admiral MCKEE. Yes, sir.

Senator GOLDWATER. By the ton?

Admiral MCKEE. You pay by the pound. This new submarine will cost about $1 billion. We pay about $1 billion for a modern cruiser in the Navy.

The submarine operates alone and unsupported. Other ships in the Navy operate in groups. This submarine can go in by itself where other ships can't. This is not to say that the rest of the Navy isn't important or that this replaces the other ships.

[Deleted.]

SOVIET NAVY

Admiral MCKEE. [Deleted.]

Senator GOLDWATER. [Deleted.]

Admiral MCKEE. [Deleted.] You have seen a 688 class submarine. It is a mean looking machine. They are paranoid about that big black submarine. [Deleted.]

Senator GOLDWATER. [Deleted.]

Admiral MCKEE. [Deleted.]

Senator GOLDWATER. [Deleted.]

Admiral MCKEE. [Deleted.]

Anyway, the important point to this that lots of people don't understand is that a handful of submarines operating in the other guy's back yard are going to tie up forces far out of proportion. As long as there is one guy [deleted], mobile enough to look like more than one, he creates a terrible situation. The principal element of that leverage is certainty and uncertainty in the minds of the enemy; certainty because he knows what this submarine can do and terrible uncertainty because he doesn't know what it will do and how we will use it.

Uncertainty is the most damaging element in the planners' book. It just drives them nuts. In submarine warfare, we bring uncertainty to the table like nothing else.

NEED FOR NEW DESIGN ATTACK SUBMARINE

If we had to go today, this submarine, the SSN 688 class, could handle the load. There are things we are doing to keep it competitive in years to come—to keep it quiet and effective. There is money, in the Navy budget to do that.

The point is, however that this SSN 688 class submarine was being designed when I was a lieutenant commander. It is our latest design. I was either promoted too fast or we are behind in technology.

Senator GOLDWATER. That is our attack submarine?

Admiral MCKEE. [Deleted.]

Senator GOLDWATER. And this torpedo?

Admiral MCKEE. [Deleted.]

Senator GOLDWATER. [Deleted.]

Admiral MCKEE. [Deleted.]

The SSN 688 is a good submarine, a quiet submarine. You were briefed the other day by Vice Admiral Thunman, Deputy Chief of Naval Operations for Submarine Warfare. I think he gave you a good description of where we are trying to go. I will pick up in an area where I think Senator Nunn asked a question. [Deleted.]

Senator GOLDWATER. [Deleted.]

Admiral MCKEE. [Deleted.]

Senator GOLDWATER. [Deleted.]

Admiral MCKEE. [Deleted.]

Senator GOLDWATER. [Deleted.]

Admiral MCKEE. [Deleted.]

Senator GOLDWATER. [Deleted.]

Admiral MCKEE. [Deleted.]

Senator GOLDWATER. [Deleted.]

Admiral MCKEE. [Deleted.]

Senator GOLDWATER. Can I ask you a technical question?

Admiral MCKEE. Yes.

Senator GOLDWATER. [Deleted.]

Admiral MCKEE. Yes, sir.

Senator GOLDWATER. [Deleted.]

Admiral MCKEE. [Deleted.]

Senator GOLDWATER. [Deleted.]

Admiral MCKEE. [Deleted.]

We can't complain. The SSN 688 is a well-designed submarine, but it is a 1964 design.

Senator GOLDWATER. Do you think you can overcome that?

Admiral MCKEE. Yes, sir. I will show you how. I have it right here. [Deleted.]

NEW DESIGN ATTACK SUBMARINE CHARACTERISTICS

To do all that, we are getting ready to build a submarine that looks different than anything we have ever built. It looks different from the SSN 688. I am going to talk a little bit about it because one of the things I get accused of is being too conventional and not trying to do enough new things.

Let me tell you that this new design attack submarine incorporates lots of nifty new ideas. There is more developmental effort in this submarine than anything we have ever done. This is the one we want to start this year.

All we need is for you to tell us to get with it. We have to address some significant technical challenges. That can only be done with very hard work. [Deleted.]

So, these are the kinds of things we have to build into this new design attack submarine. [Deleted.]

Senator **Goldwater**. [Deleted.]

Admiral **McKee**. [Deleted.]

Senator **Goldwater**. Let me ask you a silly question.

Has anybody ever put torpedo tubes aft?

Admiral **McKee**. We had them aft in World War II. We had 6 forward and 4 aft, 10 torpedo tubes.

Senator **Goldwater**. Were they effective?

Admiral **McKee**. They were very effective. You needed them in those boats because they were flat out of power on a half-hour discharge rate on the battery. The old submarines were not very maneuverable. You get in a convoy and lined up to shoot and shoot forward and then you had to maneuver and turn around and shoot at the remaining ships from the stern tubes. [Deleted.]

PROPULSION PLANT

There is a lot to do. I am not going to take your time to go hand over hand through all the items, but the point is from my standpoint—I am a garage mechanic, I build the engine—[deleted].

I have to do it without compromising any of the classic requirements for safety that we have always built into our ships. I operate 170 reactors every day. That is twice as many as the commercial power industry has and you know what kind of problems they have. I cannot afford to compromise safety in this design. [Deleted.]

Senator **Goldwater**. [Deleted.]

Admiral **McKee**. [Deleted.]

Senator **Goldwater**. [Deleted.]

Admiral **McKee**. No, sir, it is achievable. Right now I am spending all my time peddling and not enough time doing the tough technical work that makes that happen.

Senator **Goldwater**. Join the crowd.

Admiral **McKee**. It is achievable.

HYDRODYNAMIC CHARACTERISTICS

Senator **Goldwater**. I hate to keep asking you these questions and I don't know if I have the right terms. If I use aeronautical terms, it is from force of habit. [Deleted.]

Admiral **McKee**. [Deleted.]

Senator **Goldwater**. [Deleted.]

Admiral **McKee**. [Deleted.]

Senator **Goldwater**. Who cares about that?

Admiral **McKee**. That is right. [Deleted.]

A fat surface ship hull won't go. In the submarine, the longer it gets, the worse it gets. The difference is that the submarine does not have any bow wave.

On the surface the ship looks like it gets a big surf on it. As soon as it dives the surf goes away. It is an entirely different hydrodynamic situation. [Deleted.]

NEW DESIGN PROPULSION DEVELOPMENTS

This is a kind of garage door picture of the propulsion plant. By "garage door" I mean it looks like it was built in a garage.

Just to give you an idea of what it is we have to do——

Senator GOLDWATER. How much of the ship does that occupy?

Admiral McKEE. The propulsion plant will occupy about this much of the ship. [Deleted.]

There are several things that I have to get started now in order to support the new SSN. I have to design new steam generators which are boilers to take the reactor heat and turn it into steam.

I have to design new ones that are made out of different material and are more efficient. We know how to do it, but we have not built one. [Deleted.]

Senator GOLDWATER. [Deleted.]

Admiral McKEE. [Deleted.]

Here is an example of what I told you about the pumps. Using the advanced reactor technology I described, instead of having a pump that big, I have a pump this big.

Using the advanced machinery technology, I can build a [deleted] plant that is much smaller than what I would do if I used the conventional technology that exists today.

Senator GOLDWATER. It is not half?

Admiral McKEE. [Deleted.]

Those are the things that we have to do. I have to do all kinds of improvements throughout the propulsion plant. This just illustrates them. [Deleted.]

Senator GOLDWATER. [Deleted.]

Admiral McKEE. [Deleted.]

Senator GOLDWATER. Yes.

Admiral McKEE. [Deleted.]

The point I am trying to make is that you have to look at the whole propulsion plant. I can take the whole reactor and throw it away and you still have a lot of propulsion plant. We have to do things in the reactor that give us the ability to reduce the weight in the rest of the propulsion plant. There is no easy way.

NAVAL REACTORS DESIGN RESPONSIBILITY

Senator WARNER. From a jurisdictional standpoint, where do you stop and start in this design?

Admiral McKEE. In the new plant I have the responsibility for design and construction of the entire propulsion plant but I will use people in NAVSEA who have expertise in turbines, gears, and electrical generators.

I design the entire propulsion plant. My Bettis Lab is now designing the entire plant with Electric Boat.

As you know, Senator, we have preliminary design going on at both shipbuilders. The work that my lab is doing on the propulsion plant is made available to both of the shipbuilders. They take this package and fold it into their proposal for the submarine design.

Now, the point I am trying to make, is that in order to get the improvements we need, we have to get down deep into excruciating technical details, size of pumps, size of condensers, and materials.

If we don't take the time to do that, and we are working against the dollar and weight bogy, when we build the ship, the only variable in the design will be the weapon system and we will be forced to give up military capability in order to carry a lot of excess baggage around in the propulsion plant.

So, it is very important that we stop doing analytical studies and start doing the tough design work. I am doing that today on the reactor plant.

Senator WARNER. Let us refine that statement, stop this and start that.

In this subcommittee we have jurisdiction over——

Admiral MCKEE. And this is being done by the Department of Energy.

Senator WARNER. Do I understand that in the Seapower Subcommittee there is a request for authorization of SSN-21?

Admiral MCKEE. No, sir. We have the R&D for this ship right now. Long lead funds for the material will not come along until 1987 and the first authorization will be in 1989.

What we need to do is get your agreement and direction——

Senator WARNER. I understand basically what is before the committee. I am trying to dissect your statement. You are going to stop doing something and start doing something else.

Where is the decision to let you start what you want to do?

Admiral MCKEE. The Secretary of the Navy and the Chief of Naval Operations have decided we have still not gotten through all the analytical wickets you have to go through in the Department of Defense, although the Secretary of Defense has said proceed with research and development.

We have to focus the research and development on a specific design. We can't do it in a vacuum. [Deleted.] That is a bargain, but the folks in OP-02, Admiral Thunman, are still having to deal with people who want to fiddle with the fundamental design.

The more we fiddle with the requirement, the less time we have to devote to make sure we can do it right.

In terms of this committee, your responsibility lies in my work under the Department of Energy for the reactor plant; yes, sir.

Senator GOLDWATER. [Deleted.]

Admiral MCKEE. [Deleted.]

Senator GOLDWATER. [Deleted.]

Admiral MCKEE. [Deleted.]

Senator GOLDWATER. That is on the new one?

Admiral MCKEE. [Deleted.]

Senator, this is not a very well prepared presentation, but that is really what I came to say.

Senator WARNER. What I am trying to isolate is your statement you have to stop this and get started. I am not sure you are singing in the right choir because we are supportive.

I am looking at your funding requirements here.

Admiral MCKEE. I should tell you very clearly that we have all the support we have asked for in the Department of Energy.

Senator GOLDWATER. What company is doing this work? Is there one company doing this research work or do you have several?

Admiral **McKee**. The fundamental research is done by my laboratories and my prime contractors bring component vendors in to do the research and the specific component designs.

Babcock & Wilcox is working on alternatives for the steam generator design.

Senator **Goldwater**. Who is your prime contractor on this?

Admiral **McKee**. The prime contractors for my laboratories? There are two, Westinghouse and General Electric.

The supervision is the Bettis Laboratory which is a Westinghouse operation. So, that is where the fundamental work is being done.

My two prime contractors are the people who handle the business with the actual vendors. We have Newport News and Electric Boat doing design work on the submarine, both companies, in what we call preliminary design phase.

SHIP CONTROL

Senator **Goldwater**. Are the hydrodynamic problems great on the whole, overall?

Admiral **McKee**. No sir. The hydrodynamics problems are pretty well in hand. [Deleted.]

Senator **Goldwater**. [Deleted.]

Admiral **McKee**. [Deleted.]

Senator **Goldwater**. [Deleted.]

Admiral **McKee**. [Deleted.]

Senator **Goldwater**. [Deleted.]

Admiral **McKee**. [Deleted.]

Senator **Goldwater**. [Deleted.]

Admiral **McKee**. [Deleted.]

Senator **Goldwater**. [Deleted.]

Admiral **McKee**. [Deleted.]

Senator **Goldwater**. [Deleted.]

Admiral **McKee**. Yes, sir.

Senator **Goldwater**. [Deleted.]

Admiral **McKee**. [Deleted.]

Senator **Goldwater**. [Deleted.]

Admiral **McKee**. [Deleted.]

SUBMARINE PROGRAM FUNDING

Senator **Warner**. I think it would be helpful now if we got down to dollar figures and specific authorization. I have been advised by counsel for the Seapower Subcommittee, and I want to be careful not to get into their jursidiction, that the amount of $650 million is the total for the submarine, Department of the Navy, and breakout might be somewhere around $170 million for the new submarine.

Admiral **McKee**. The $650 million is fundamental research for the submarine program. The $174 million is an add-on to those programs. What we want to do is draw from these programs to build a new submarine.

In some cases because there was no focus for these programs, in order to get them to the right time so that we can draw from them when we need them, there were deltas put into those lines which totaled $174 million.

So, what we need on the Department of the Navy side is the base and we need the $174 million. There is a little confusion that it is just the $174 million that we need. That is wrong.

I have money on both sides. I am part of that Navy side. It has advanced reactor components—for example, funds to do some of the new steam generator work and main powerplant work.

CORE LIFE

On the Department of Energy side you are familiar with the process. I have to design the reactor, build the core, put it in a prototype and get it running at least 2 years before the ship gets its core and begins running.

We won't prototype it all the way, we don't have to this time, but we always want the prototype core running ahead of the one in the ship because these are long-lived cores. [Deleted.]

Senator **Warner**. What is that in terms of years?

Admiral **McKee**. [Deleted.]

Senator **Warner**. The orginal design was about 12?

Admiral **McKee**. We started with 6 months for the *Nautilus* prototype. [Deleted.]

Admiral Rickover's dream was to build one that would last the entire life of the ship. We have done the technical work to be able to do that. The trouble is folks keep making the ships last longer.

So, it is a moving target. The Department of Energy money is all R&D, but that covers my entire cradle-to-grave operation.

I do the fundamental research and development for this and for old ships to take care of problems that come up in the 25th or 26th year.

I would summarize by saying on the energy side, the money we need to do this work is there and is well supported. There is a little uncertainty on the Navy side.

Senator **Goldwater**. I read where a carrier docked yesterday after 60,000 miles without refueling.

Admiral **McKee**. That was not a nuclear carrier. She refueled.

Senator **Goldwater**. I thought it was nuclear.

Admiral **McKee**. No, sir. That was the *Independence*.

Senator **Goldwater**. That is a long way.

Admiral **McKee**. She refueled a few times. But those big conventional carriers carry a lot of fuel.

Senator **Goldwater**. Mr. Chairman, I am going to have to leave. I thank you very much. I am sorry I have to go, but I have another committee meeting.

Senator **Warner**. We are delighted today to slap you with a little salt water.

Admiral **McKee**. Thank you very much, Senator Goldwater. I appreciate your coming.

DEPARTMENT OF ENERGY AUTHORIZATION REQUEST

Senator **Warner**. What I would like to do now is to get a clearer definition of what portion of your request today falls under the Department of Navy account and what falls under the Department of Energy account.

Admiral McKee. The request you are considering today is all under the Energy Department.

Senator Warner. All under the Energy Department?

Admiral McKee. Yes, sir.

Senator Warner. That portion of ship construction that relates to nuclear power—less that portion having to do with the reactor itself—is in the Navy budget and is under the jurisdiction of the Seapower Subcommittee; is that correct?

Admiral McKee. That is right, but I have responsibilities in both areas.

Senator Warner. I just want to get my internal accounting straight here.

You want $426 million for operating expenses. Let us address that $426 million a minute.

Admiral McKee. The $426 million in the operating account covers a wide range of my activities. It operates the eight prototype reactor plants that I have in New York and in Idaho. It sponsors the research and development that we do.

Fundamentally that is broken down into plant development, components that go with the reactor itself, which is about $64 million. Reactor development, that is the development of the reactor plant, and reactor cores, is about $229 million.

Reactor operation and evaluation, which is the business of the prototype operation and the laboratory operation, which is $122 million, and program direction, that is my headquarters, for $11 million. That is what the operating money does for us.

Within the aegis of those broad categories we then do work in metallurgy and component design. We operate the advance test reactor in Idaho which is a very broad program of individual efforts, all focused on solving problems in old submarines as well as doing the research and development for new submarines.

As I said, it is a cradle-to-grave responsibility. Some of that money we spend on the disposal issue that you are familiar with. My labs have pieces of metal on the bottom of the ocean as experiments to validate some of our concepts for disposal at sea or disposal on land.

TACTICAL EQUIPMENT

Senator Warner. The next major piece is $22.5 million for tactical equipment.

Admiral McKee. Yes, sir; $22.5 million is for capital equipment. Some of that is for upgrading engineered safety systems at the prototypes.

The first ones were built years and years ago and as the state of the art has improved in some of the auxiliary systems, we have undertaken programs to enhance our operation.

We also are spending money on computers to do our design and analysis work.

In the construction account we are in the next to the last year of funding for the Fuel Factory. We are building a Government-operated facility at Savannah River so that we will have two sources of fuel.

Today I have only a single source of fuel for these ships, not the cores, but the fuel that goes into the cores, and that is a commercial operation under Getty down in Tennessee.

They have operated successfully, but having a single source for that critical material is wrong. So, we had an authorization in 1982 to build a plant and it is about halfway finished. It will be in operation in 1987.

Senator **Warner**. That is it?

Admiral **McKee**. Yes, sir, that is it.

Senator **Warner**. You have a more detailed breakout on page 3 of your statement?

Admiral **McKee**. Yes, sir.

TRAINING OF NAVAL NUCLEAR REACTOR OPERATORS

Senator **Warner**. Would you discuss briefly your plan for training nuclear reactor operators?

Admiral **McKee**. As you know, Senator, we train our people in two places, we train them in school in Orlando, FL, and train them on operating reactors at the prototypes.

We have initiated a program in the Department of the Navy to look for an alternative way to do that practical training. We have eight prototypes today, but they are not going to last forever and I doubt if we will ever have eight different designs coming to fruition at the same time as we did in Admiral Rickover's early days.

So, I have to find a way to do that training without building eight more prototypes.

I proposed to the Secretary of the Navy and the Chief of Naval Operations to take a submarine that is going to be decommissioned and convert it to a training ship so that I can do reactor training on board.

We are doing the fundamental engineering on that right now to make the necessary ship modifications. [Deleted.]

We have the ability to do it in the same way under the Department of Energy control, but in an old submarine instead of a prototype. That will enable us to supplement the prototypes when the time comes.

[Additional information follows:]

Training Naval Nuclear Propulsion Operators

Senator **Warner**. We discussed the need to continue training naval nuclear propulsion plant operators on real reactors as has been the practice since the inception of the Program. Please address the following issues for the record:

How and where nuclear propulsion plant operators are presently trained.

The need to augment training capacity and when.

The advantage of using an inactivated submarine rather than building a new prototype for this purpose.

If successful, could this approach be a way to ensure the ability to train on actual reactors in the event some of the existing DOE prototypes become impractical to maintain?

Will the Department of Energy continue to be able to exercise control over operation of training reactors?

What funds would be required to enable the Navy to utilize for this purpose one of the submarines due to come off the line in the 1987 timeframe? Would this be in time to preclude a shortfall in training capacity?

What assurance is there that using a submarine to demonstrate the practicality of this training approach will not in any way detract from the DOE's commitment to continue to make existing DOE-owned prototypes available for R&D and training and to construct new prototypes as required to support research and development for advanced naval reactor applications?

Admiral McKee. Initial training in operating reactors has historically been carried out in prototype plants owned and operated by the Department of Energy (DOE). This training is essential to ensure safe and effective operation of naval nuclear propulsion plants.

To maintain standards of the Naval Nuclear Propulsion Program, sufficient operating reactors must be available for training plant operators. However, several factors have now begun to affect the program's ability to satisfy this requirement. These include increased manning for additional nuclear powered ships, increasing prototype age and maintenance, and limited demand for new research and development prototypes for naval applications. By deferring or rescheduling prototype maintenance, and with minimal unplanned outages, we will be able to accommodate the training load through 1987. However, commencing in CY 1988 with the anticipated decommissioning of the NAUTILUS prototype, a progressively severe long term training capacity shortfall is projected to occur due to inability to retain sufficient existing prototypes on line to meet projected training requirements.

The DOE will continue to maintain and operate the existing prototypes for both research and training purposes as long as it is practical to do so. Further, the DOE will construct new prototypes when required to support research and development for advanced naval reactor applications. However, Navy requirements are not expected to necessitate construction of new prototypes on a one-for-one replacement basis or result in a net increase in total training capacity.

As an alternative to building additional land-based reactors to meet training requirements, inactivated submarines could be modified for this purpose at a fraction of the cost. Moreover, if given the go-ahead, one of the submarines scheduled for inactivation in the mid 1980's could be used to demonstrate the practicality of this approach for the future while at the same time avoiding the nearer term shortfall in training capacity. The cost of this effort is estimated to be $223 million, of which $30 million would be required two years prior to ship inactivation to initiate planning and design effort and for long lead material procurement.

The Secretary of Energy has assured the Navy that the use of inactivated submarines for training reactor operators would in no way detract from the DOE's commitment to operate prototypes for R&D and training; to construct new prototypes when needed; and to continue to control operational training and qualification of all naval nuclear propulsion plant operators.

Admiral McKee. We also must continue to run the school. Our training load is about 3,000 people a year. The source requirements have been amply taken care of.

We have a little trouble in the House mark of $15 million against the Navy specialized skill training which includes my nuclear training program. They thought that we had increased the cost of it. We had not. The scope of my training program has not changed. Actually we just took money out of one account and put it in another where it was more appropriate so there has been no growth in the program, but we will need some help on the Senate side, to look at that.

NUCLEAR PROPULSION PROGRAM RESPONSIBILITY

Senator Warner. What is the quality of individuals you are able to induce in the program today?

Admiral McKee. We are doing very well. The officer enlisted candidates are really quite good. The officer candidates that I have interviewed in the past 3 years have been just a little better each time. That has been helped partially by the economy, of course.

An interesting aspect of this is that an awful lot of the people who come to me or influence people to come to me are young men in the co-op programs in college, they go out and work for a company for a while and then go back to school. They have to be engineers.

When I ask, "Why do you want to join our program?" almost all of them say, "I have done my co-op with General Electric and I find myself sitting at a desk in a room with 10 other guys 10 years older than I am doing the same thing. I don't want to be doing the same thing in 10 years. It looks to me like I could learn something, gain some earlier responsibility in your program, so here I am."

We have seen an increasing number of these individuals. A lot of that has to do with the fine recruiting job done by the Navy recruiter.

Senator **WARNER**. There was, you will recall, an inducement to go out of the program because of the conditions in the civilian sector. That seems to be tapering off. That is not reflected in the pipeline?

Admiral **McKEE**. No, sir, the young people we get are exposed to earlier responsibility and tough technical challenges that enable them to go anywhere.

We still have as much pressure on our young officers today as we did when the nuclear power industry was flourishing.

Senator **WARNER**. Do you need language on the fiscal year 1985 funding the plan?

Admiral **McKEE**. We don't have anything in the fiscal year 1985 budget, but it would be nice to have language in the bill so that if there is money available to get an early start on this training ship we could do it.

Senator **WARNER**. [Deleted.]

Admiral **McKEE**. [Deleted.]

Senator **WARNER**. Last year we included a provision, S. 1107, to the program to codify the functions in your office. The bill did not get enacted because the House did not act.

Do you feel we should again initiate the provision to codify?

Admiral **McKEE**. Yes, sir. I think it would be helpful to do that.

Senator **WARNER**. It is something that the late Senator Jackson was interested in.

[The prepared statement of Admiral McKee and accompanying reports follow:]

PREPARED STATEMENT OF ADM. KINNAIRD R. McKEE, U.S. NAVY, DIRECTOR, NAVAL NUCLEAR PROPULSION PROGRAM

INTRODUCTION

Last year, I devoted a significant part of my statement to describing the defense contribution of our nuclear powered warships. I also described the general reponsibilities of the Naval Nuclear Propulsion Program, emphasizing some of the basic philosophy that provides the foundation for our record of safe and successful operation.

Since then the responsibilities of the Naval Nuclear Propulsion Program have grown as more ships continue to be delivered to the fleet. We also have important new things to do.

During the past year, we commissioned our fourth Trident submarine, *Georgia*, bringing, our Trident submarine force to four with seven more authorized.

We delivered 4 more 688 Class submarines, bringing the 688 force to 25 with 19 more authorized.

The Navy's fiscal year 1985 budget proposes to add another Trident and four attack submarines to that force.

Highly capable 688 class submarines are entering the fleet in numbers today. Together with the still formidable 737 Class, they constitute an impressive submarine force that can handle its Soviet counterpart.

That is fine for now, but we must also ensure that advantage for the future, in a harsher environment and against opposition by greater numbers of even more capable submarines and aircraft. To do that, we need to press vigorously ahead in all aspects of submarine development, integrating a proper balance of the most useful concepts into a new ship design.

It is with that in mind that the Chief of Naval Operations has identified R&D funding for a new design attack submarine as a top priority item in the President's fiscal year 1985 defense budget request. The Secretary of Defense has endorsed our current plans aimed toward authorization of a lead ship in fiscal year 1989.

This is a major undertaking; one that will draw extensively on R&D work supported by this Committee, so I thought it would be helpful if I explained what the ship must do and why we must get on with it. To do that, we need to focus on the utility of attack submarines and that, in turn, leads directly to a discussion of the tactical utility and the leverage they provide.

TACTICAL AND STRATEGIC LEVERAGE

When we review naval engagements of the past, or estimate the outcome of engagements in the future, there is a tendency to become preoccupied with individual tactical considerations, but more important is the question of how each affected the overall course of the war. What leverage did the individual action or threat of action, exercise on forces in another theatre and how did that affect the outcome of the war? We must understand this principle of leverage but we must also have the tools to use it to our advantage.

To do this, we must create in the minds of a potential adversary both a certainty and an uncertainty; a certainty with regard to our own ability—what we can do—and in combat, a terrible uncertainty as to what we will do. Certainty of our ability to inflict damage can dictate the scope and nature of resources dedicated to protect their forces, while uncertainty as to our intentions can dictate additional commitment of resources and redistribution of their military forces.

The question of whether we win or lose will depend not only on the degree of damage our submarines can inflict, but also on how they influence the overall employment of enemy naval and air forces. In a crisis, fear of our attack submarines ties up Soviet naval and air forces that might otherwise be used against our NATO resupply, in support of a land campaign in Europe, or against our own supply lines. What we would most like to do is to insert such uncertainty into Soviet estimates that they will be deterred from executing their war plans in the first place.

HISTORICAL PRECEDENTS

The leverage provided by submarine warfare first became evident in the early days of World War I when the German submarine U-9 sank three British cruisers in a single encounter. That action caused the British to withdraw the Grand Fleet—first to Western Scotland, later to North Ireland—while they improved defenses at the Scapa Flow anchorage. They also made a major reassessment of their war plans that effectively reduced the useful size of their battle fleet and enabled an inferior German Navy to pose a more significant threat on the high seas.

German submarine activity also created an attitude of excessive caution that hampered British naval operations for the remainder of the war. The Commander-in-Chief of the Grand Fleet, Sir John Jellicoe, explained it to the Admiralty this way:

"If . . . the enemy battle fleet were to turn away from our advancing fleet, I should assume that the intention was to lead us over mines and submarines, and should decline to be so drawn."

Two years later, Admiral Jellicoe lost a singular opportunity to defeat the High Seas Fleet when he failed to pursue after the Germans broke off the engagement at Jutland.

German submarines went on to sink over 5,000 allied ships, 15 million tons, during World War I. In World War II, they sank over 20 million tons. The Battle of the Atlantic required the commitment of immense tactical Allied resources to regain control of that ocean from German submarines. In the Pacific, U.S. submarines accounted for two-thirds of Japanese merchant marine losses and tied up or sank significant elements of the Japanese Fleet; all with a submarine force that represented about three percent of our Pacific fleet.

The physical damage inflicted by submarines in both wars was of critical importance, but their overall contribution was much greater because they forced major diversions of resources in every maritime theatre. The mere suspicion of a submarine presence was enough to influence ship captains, fleet commanders and war planners alike. That has not changed. In the recent Falklands campaign, the sinking of one old cruiser, *Belgrano*, by the British nuclear submarine, *Conqueror*, was enough to convince Argentine military leaders they should keep their fleet in port for the duration. They did so, not really knowing whether the British had one submarine in the area or many. After the sinking, they did not even know whether one was there at all. That terrible uncertainty disabled the Argentine fleet far more than the loss of a single cruiser.

NAVAL MISSIONS

Up to this point, what I have described is the application of basic principles of warfare that will remain as useful in the future as they have been in the past. These include such concepts as security of the base, avcailability of reserves, cover and deception, concentration of force, and tactical flexibility. Nuclear powered attack submarines create the opportunity to convert these principles into substantial leverage in an even broader dimension.

Today's balanced naval forces are structured to apply these principles in six primary mission areas. The naval strategic deterrent mission is accomplished entirely by our ballistic missile submarines. Our attack submarines have become principal players in strike, anti-submarine, and mine warfare. They also have important supporting roles in amphibious and anti-air warfare missions.

SUBMARINE CHARACTERISTICS

Our submarines can do these things because of their unique characteristics. They are invisible on station. They can operate alone and unsupported in waters controlled by the enemy, though they also have the ability to operate in coordination with other forces. Finally, they have what it takes to survive in the face of numerically superior opposition. Skillfully employed, our attack submarines can exercise a major influence on the employment of Soviet ships and aircraft—and in so doing, multiply the effectiveness of our other forces.

What I have just described is guerrilla warfare at sea. Stealth, maneuverability, and firepower are determining factors in that environment. Increased firepower is already on the way with the advent of vertical launchers in the *Los Angeles* class. In submarine warfare, stealth calls for quite operation while maneuverability dictates a need for speed and depth. These requirements might appear to conflict, but we have the technology to resolve that conflict and obtain increased quiet speed and depth.

"LOS ANGELES" CLASS

The design of our present first line attack submarine was something we were working on in the mid 1960's when I was a Lieutenant Commander on Admiral Rickover's staff. Even that was not a completely new ship design. To achieve higher speed, we simply added a more powerful propulsion plant to the basic weapons and sensors arrangement of the *Sturgeon* Class. When the importance of increasing speed became evident, what was intended as a one-of-a-kind experiment quickly expanded into an entire class of submarines—our present *Los Angeles* Class.

The *Los Angeles* Class exceeded our expectations right from the first, and we have continued to improve the product. Over the years, and within the constraints of the basic design, we have substantially upgraded sensors, weaponry, and quieting. The most recent example is incorporation of vertical cruise missile launchers beginning with the fiscal year 1978 ships. But there are limits to how far we can go with the existing design. We have virtually exhausted the possibilities for the *Los Angeles* Class.

THE SOVIET VIEW

The Soviets clearly understand the utility of submarines and the extraordinary level of resource commitment needed to counter a serious submarine threat. Again, the precedent is historical. Soviet Admiral of the Fleet Gorshkov sized it up this way:

"for each German U-boat, there were 25 British and U.S. warships and 100 aircraft, and for every German submariner at sea there were 100 British and American anti-submariners. Yet, nevertheless, this significant numerical superiority of defenders was insufficient to force the attackers to fully curtail their active operation. Therefore the question of the ratio of submarines to anti-submarine forces is of great interest even under present-day conditions, since, if ASW forces, which were so numerous and technically up to date for that time, possessing a vast superiority, turned out to be capable of only partially limiting the operations of diesel submarines, then what must this superiority be today to counter nuclear submarines, whose combat capabilities cannot be compared with the capabilities of World War II-era submarines."

Submarines offer the Soviets the same leverage they offer us, although we enjoy a significant geographical advantage. If we did not have submarines capable of getting into their backyard, they could concentrate major forces against supply lines we need for NATO reinforcement and against other naval forces. In short, they can pose many of the same problems for us that we do for them—problems that can only be countered effectively by state-of-the-art U.S. submarines operating near their shores.

SOVIET NEW DEVELOPMENTS

Admiral Gorshkov knows this as well as we do. He is determined to build the best submarine force in the world and to do so in significant numbers. The range and depth of the Soviet submarine design and construction effort is awesome. Two recent products of the system attest to its momentum and to the determination of its sponsors. Last year, while we were developing and justifying requirements for the first new U.S. attack submarine design in over twenty years, the Soviets launched two new SSNs, each believed to be the first of a class. Our 688 Class will have to contend with those ships next year. Our new design SSN will have to contend with other, more advanced Soviet designs we expect to appear over the next decade.

Meanwhile, Soviet *Victor* III's patrol our side of the Atlantic now. They are very quiet and capable submarines. It is also interesting to note that production of the less quiet *Alfa* Class appears to have been terminated after a run of seven. Apparently they view the *Alfa* less useful than the quieter and more capable *Victor* III.

The Soviets have a numerical advantage today—and unless we act quickly, they will eventually gain the qualitative advantage they need to neutralize the leverage we now enjoy.

THE NEW ATTACK SUBMARINE

We are at a point today where submarines can exercise the same sort of revolutionary influence on naval warfare that the advent of sea based air power brought to World War II. Yet this in no way diminishes the individual and collective usefulness of other naval forces. The leverage and tactical utility of our modern carrier battle groups and amphibious forces still weigh heavily in all of our plans. What submarine forces provide is enhancement, and the ability to influence where and how the Soviets elect to commit their naval resources. We must preserve the qualitative advantage of our submarines that makes this possible.

We have the technology in hand for a new submarine that will substantially outperform our *Los Angeles* Class, and which should preserve our lead. We need to get on with building the new submarine. It will have a marked improvement in quiet speed, greater depth, better detection capabilities, and greater firepower. We can afford to build these ships without disrupting other important programs. They will not be inexpensive, but they are a good investment, with a high rate of return in terms of the forces they can destroy and the leverage they can provide.

ATTACK SUBMARINE SUMMATION

In the final analysis, our attack submarines provide unprecedented flexibility and leverage. A relatively small force of 100 modern attack submarines when properly manned and used offers our defense planners substantial opportunities to increase the overall utility and flexibility of our other military forces and to influence, and even control, the concentration of force. In most campaigns, that factor will probably be the determinant. We must ensure that advantage for the future.

PROPOSED WORK

The Naval Reactors portion of the Department of Energy's fiscal year 1985 budget request, of course, covers more than just the developments for the new design submarine and work on the Advanced Fleet Reactor which I explained last year. The work encompasses our overall development effort including materials, plants, and reactors, our cradle-to-grave technical responsibilities for 170 operating reactors and operation of our land-based prototype reactor plants to test new concepts. This year's budget includes $426.4 million for operating expenses, $22.5 million for capital equipment and $48.0 million for construction work for a total of $496.9 million to continue ongoing work to advance nuclear propulsion. I have attached an expanded description.

CONTROL OF RADIOACTIVITY

I have also attached copies of two reports. One describes the performance of the program last year in controlling radioactive waste and the other describes our performance in minimizing occupational radiation exposure. A review of these will show our extreme care in dealing with radioactivity. Maintaining this record will be a central element in our continuing work and in designing the new attack submarine.

CONCLUSION

Although work on the new design attack submarine is vitally important to maintain our edge in the 1990's and later, we must still continue to pay attention to the less exotic but vitally important aspect of continuing the safe and reliable operation of the ships we have. This involves careful selection of personnel, vigorous training and careful monitoring of the performance of reactor operators, equipment, and reactor materials throughout the life of our nuclear powered ships.

In short, we have to continue the same kind of careful attention to detail which has been the hallmark of this program since its inception. Without the continued strong support we have enjoyed over the years from Congress, this would not be possible.

I would be happy to try and answer any questions you may have.

Fiscal Year 1985 Department of Energy Budget Request for the Naval Reactors Development Program

The purpose of the Naval Reactors Development program is to design, develop, test, evaluate, improve, and ensure the safe operation of naval nuclear propulsion reactor plants. The intent is to enhance the performance, reliability, and safety of naval rectors while simplifying plant operating and maintenance requirements. The 161 shipboard nuclear propulsion plants currently power over 40 percent of the Navy's combatant fleet. The continuing support and improvement of nuclear powerd propulsion plants is vital to the National defense.

The major program development effort is the Advanced Fleet Reactor which will provide improved plant performance for the next generation of nuclear powered attack submarines. The Advanced Fleet Reactor will incorporate advances in reactor fuels, materials, and plant components generated from an ongoing effort to develop improved reactor cores, concepts, components, and materials. These improvements will result in the Advanced Fleet Reactor being a higher power, quieter, and more reliable reactor plant.

In parallel, development work on further propulsion plant improvements will be incorporated into prototype cores and components for testing and evaluation prior to fleet application. This work will investigate reactor concepts which offer the potential of increased power and longer life. Crucial to the success of these new concepts is a continuing effort to develop and improve rector materials, fuels, and poisons. These materials must be capable of withstanding new requirements which result from a higher performance core.

Work is proceeding on the Submarine Test Core, which will test improved reactor fuels, materials and techniques that promise enhanced performance, and the Development Materials Core, which will be used to evaluate the operational response of new materials, poisons, and configurations. Each of these cores will be tested in prototype land-based reactor plants. These prototype plants provide the only proven means to determine design suitability and adequacy under actual operating plant conditions.

Work to enhance performance and ensure safe and reliable plant operation continues even after a plant or system becomes operational. This work includes the S8G reactor plant used in the Trident ballistic missile submarine as well as other operating plants and the higher power, longer life D2W core. Other ongoing efforts to improve plant performance and further safety and reliabilty include: continuing tests of prototypical cores and components; improvements to and evaluation and analysis of existing nuclear propulsion plants, cores, components, systems, and materials; and development of replacement components and systems.

The fiscal year 1985 Naval Reactors Development budget request is $496.9 million to continue the work noted above. The fiscal year 1985 request is $3.9 million over the fiscal year 1984 budget. The details of the request, by major area, are:

Budget authority

	In millions
Reactor development	
Operating expenses	$229.3
Capital equipment	22.5
Construction	48.0
Subtotal	299.8
Plant development: Operating expenses	63.9
Reactor operation and evaluation: Operating expenses	122.0
Program direction: Operating expenses	11.2
Total naval reactors development	496.9

The following discussion summarizes the work in these major areas:

I. REACTOR DEVELOPMENT

Reactor Development focuses on improving the power, capability, reliability, and endurance of naval reactors. Improvements are effected through the design and development of advanced reactor concepts and components and through incorporation of new reactor fuels and materials. Experience with operating reactors and examination of spent cores are also used in developing and evaluating technology to improve reactor performance.

To support present and future reactor plant advances there must be a continuing reactor design effort coupled with analysis of operating reactors. The overall design objective is to improve plant performance by increasing the power capability and endurance of naval reactor cores.

The Advanced Fleet Reactor will provide the improved plant performance necessary for the next generation of nuclear powered submarines. The Advanced Fleet Reactor will have a higher power core in addition to incorporating the latest advanced quieting techniques. Also, design efforts are underway to make this plant simpler and more reliable, giving it more operational flexibility.

Development of advanced materials and fuels is instrumental in improving the power and endurance of a naval reactor. Increasing core performance heightens the need for advanced materials and for advanced analytical models to optimize core designs and arrangements. New fuels, poisons, and materials are developed and tested in operating reactor plant environments to confirm their suitability for naval application.

To test the most promising possibilities, two prototype cores are under development. The Submarine Test Core will be used to test improved reactor fuels and various cladding techniques using different materials and manufacturing treatments. The Developmental Materials Core will test further advances in fuel concepts and, in addition, will provide the means for evaluation of new poisons and advanced design equipment for controlling reactor performance.

Proving out new concepts and designs involves fabrication of reactor plant cores and components for installation, operation and testing in prototype reactor plants to ensure conformance with design criteria. To maintain strict compliance with design specifications, Naval Reactors develops sophisticated manufacturing processes and inspection techniques which are used to aid and monitor core and material vendors.

Examination of spent reactor cores provides valuable information about core performance and the effects of reactor operation on materials. Information gained from these examinations is vital to improving the performance of new cores. Combining this information, sound analysis, and new developments in reactor technology ensures optimal peformance and safety.

During fiscal year 1985, Reactor Development work will include: the continuation of the design effort for the Advanced Fleet Reactor, preproduction of fuel elements, and fuel assemblies, analysis and fabrication of major components such as the core barrel, closure head and control drive mechanisms, and intensive thermal, mechanical, and noise testing and analysis; analysis and development work required for the installation of the Submarine Test Core and completion of physics acceptance and certification testing; and continued work on the Developmental Materials Core.

In addition, work will also include: examination of expended cores and irradiated test specimens; evaluation of material corrosion behavior; continued development of the Modified Fuel Process; and continued qualification of noise and vibration design procedures and noise and vibration testing of prototypic components.

CAPITAL EQUIPMENT

Capital equipment required for fiscal year 1985 provides for the upgrading and replacement of laboratory and prototype plant equipment, components, and systems, such as reactor control, instrumentation and monitoring systems; quality assurance equipment; laboratory analytical and test equipment; and safety equipment.

CONSTRUCTION

Construction funds are requested in fiscal year 1985 to continue two projects: the Materials Facility, project number 82-N-111, which will provide a second source for manufacture of naval nuclear fuel and is in its fourth year of funding; and the Modifications and Additions to Prototype Facilities, project number 81-T-112, which will modify and add engineered safety features to several prototype propulsion plants and is in its fifth year of funding.

II. PLANT DEVELOPMENT

Plant Development provides for improving reactor plant capability exclusive of the reactor itself, with primary emphasis on improving plant reliability and performance, increasing ease of plant operation and maintenance, and improving plant shock resistance. The work is important because propulsion plant characteristics cannot be improved solely through work on the reactor. To realize any significant increase in overall propulsion plant capability, plant development work must progress hand in hand with advances in reactor technology.

Principal efforts include the development of improved plant components and systems, alternate plant structural materials, improved material processing treatment methods to reduce corrosion, and new methods for chemistry treatment and water purification. The component and system development effort encompasses primary plant fluid, mechanical, and electrical systems and instrumentation, reactor plant control systems and components; and primary and secondary plant components.

A sound understanding of the properties and characteristics of various materials and water chemistries is vital to determining the efficiency and reliability of a reactor plant. A comprehensive testing and evaluation effort selects candidate materials having improved corrosion, fatigue and wear characteristics. Water chemistry and purification work is done to determine methods having the least adverse effect while keeping the coolant as free from corrosion products as possible.

In 1985, Naval Reactors will continue Plant Development efforts including: development, testing, and evaluation of reactor plant components and component materials such as improved power supplies; plant analyses to develop and maintain operating and casualty procedures; testing of various steam generator servicing techniques; testing of improved water chemistry treatments; the design of microprocessor-based instrumentation and control equipment; and operating multi-purpose test facilities for use in evaluating problems and improving plant performance.

III. REACTOR OPERATION AND EVALUATION

Reactor Operation and Evaluation involves the operation, servicing, upgrading, and testing of the eight land-based prototype nuclear propulsion plants. These prototypes are operated to test developmental concepts, components and cores for naval nuclear propulsion plants, and are fully instrumented to provide data needed for the evaluation of reactor plant equipment.

A great deal of testing of individual materials, components and systems is done, leading to the selection of the most promising for incorporation into a prototype plant. Only in the operating prototype plants can actual in-service conditions be duplicated and, consequently, a determination made as to true attributes, design suitability and adequacy. To operate for a core lifetime requires in excess of thirteen years. Equipment cannot be withheld from the fleet this long, but a lead time of two to three years is allowed prior to use in fleet nuclear propulsion plants. Once equipment is committed to shipboard plants, the prototype continues the vital function of operating ahead of the shipboard plants to determine operating characteristics and detect any potential problems in the later years of operation. Additionally, performance of this testing in prototype plants avoids interference with fleet activities.

Servicing of the prototype plants is also performed. The servicing work includes maintenance, refuelings, disassembly, fuel exchange and reassembly, component examination, and component removal and replacement. Equipment and procedures for performing this servicing work are developed and refined, and are used to the maximum extent possible in carrying out fleet servicing work.

For fiscal year 1985, work in the Reactor Operation and Evaluation area will include: operation of the prototype plants; design, development, and checkout of servicing and refueling systems, equipment, and procedures, completing the D1G prototype plant interim inspection and overhaul; commencing the S5G prototype plant refueling and overhaul; preparing for the S1W and S3G prototype plant refueling and overhauls; and performance of reactor plant nuclear, thermal, hydraulic, mechanical tests, plant modifications, routine maintenance and training.

IV. PROGRAM DIRECTION

To support the Naval Reactors Development and Water Cooled Breeder programs, the program direction funds provide for salaries, benefits, travel, and other expenses for 213 full time Federal employees at the Naval Reactors, Pittsburgh Naval Reactors, and Schenectady Naval Reactors Offices.

Naval Reactors operates with austere staffing. Existing personnel are used to the greatest extent practicable in staffing new efforts and expansions of existing programs. Improvements in work force productivity have been achieved over the years, despite increasing workloads, by effective use of available staff.

Report NT-84-1
February 1984

ENVIRONMENTAL MONITORING AND DISPOSAL OF RADIOACTIVE WASTES FROM U.S. NAVAL NUCLEAR-POWERED SHIPS AND THEIR SUPPORT FACILITIES 1983

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ABSTRACT

The environmental effect of disposal of radioactive wastes originating from U. S. Naval nuclear propulsion plants and their support facilities is assessed. The total gamma radioactivity in liquids, less tritium, discharged to all ports and harbors from the more than one hundred Naval nuclear-powered ships and supporting tenders, Naval bases and shipyards was less than 0.002 curie in 1983. This report confirms that procedures used by the Navy to control releases of radioactivity from U. S. Naval nuclear-powered ships and their support facilities are effective in protecting the environment and the health and safety of the general public.

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SUMMARY

The radioactivity in wastes discussed in this report originates in the pressurized water reactors of U. S. Naval nuclear-powered ships. As of the end of 1983, the U. S. Navy had 129 nuclear-powered submarines and thirteen nuclear-powered surface ships in operation. Support facilities involved in construction, maintenance, overhaul and refueling of these nuclear propulsion plants include eight shipyards, seventeen tenders and four submarine bases. This report describes disposal of radioactive liquid wastes, transportation and disposal of solid wastes, and monitoring of the environment to determine the effect of radioactive releases, and updates reports on this subject issued by the Navy in references 1 through 18.* This report concludes that radioactivity associated with U. S. Naval nuclear-powered ships has had no significant or discernable effect on the quality of the environment. A summary of the radiological information supporting this conclusion follows:

From the start of the Naval nuclear propulsion program, the policy of the U. S. Navy has been to reduce to the minimum practicable the amounts of radioactivity released into harbors. Navy procedures to accomplish this have been reviewed with the U. S. Department of Energy, the U. S. Nuclear Regulatory Commission and the U. S. Environmental Protection Agency. The total gamma radioactivity released within twelve miles from shore from all U. S. Naval nuclear-powered ships and their support facilities in recent years is shown in Table 1; this includes all harbors both U. S. and foreign entered by these ships.

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*References are listed on page 35.

TABLE 1 RADIOACTIVE LIQUID WASTE RELEASED TO HARBORS FROM U. S. NAVAL NUCLEAR-POWERED SHIPS AND THEIR SUPPORT FACILITIES

Year	Number of Ships In Operation	Radioactivity-Curies (less tritium)
1971	100	less than 0.002
1972	104	less than 0.002
1973	107	less than 0.002
1974	111	less than 0.002
1975	113	less than 0.002
1976	115	less than 0.002
1977	120	less than 0.002
1978	124	less than 0.002
1979	126	less than 0.002
1980	126	less than 0.002
1981	133	less than 0.002
1982	137	less than 0.002
1983	142	less than 0.002

As a measure of the significance of these data, if one person were able to drink the entire amount of radioactivity discharged into any harbor in any of the last thirteen years, he would not exceed the annual radiation exposure permitted for an individual worker by the U. S. Nuclear Regulatory Commission.

Environmental monitoring is conducted by the U. S. Navy in U. S. and foreign harbors frequented by U. S. Naval nuclear-powered ships. This monitoring consists of analyzing harbor water, sediment and marine life samples for radioactivity associated with Naval nuclear propulsion plants, radiation monitoring around the perimeter of support facilities and effluent monitoring. Environmental samples from each of these harbors are also checked at least annually by a U. S. Department of Energy laboratory to ensure analytical procedures are correct and standardized. The U. S. Environmental Protection Agency has conducted independent surveys in U. S. harbors; results have been consistent with Navy results. These surveys have confirmed that U. S. Naval nuclear-powered ships and support facilities have had no significant effect on the radioactivity of the marine environment.

RADIOACTIVE LIQUID WASTE PROCESSING AND CONTROL

Policy and Procedures Minimizing Release of Radioactivity in Harbors

The policy of the U. S. Navy is to reduce to the minimum practicable the amounts of radioactivity released to the environment, particularly within twelve miles from shore including into harbors. This policy is consistent with applicable recommendations issued by the Federal Radiation Council (incorporated in Environmental Protection Agency in 1970), U. S. Nuclear Regulatory Commission, National Council on Radiation Protection and Measurements, International Commission on Radiological Protection, International Atomic Energy Agency, and National Academy of Sciences--National Research Council (references 19 through 27). Keeping releases small minimizes the radioactivity available to build up in the environment or to concentrate in marine life. To implement this policy of minimizing releases, the Navy has issued standard instructions defining the radioactive waste disposal limits and procedures to be used by U. S. Naval nuclear-powered ships and their support facilities. These instructions were reviewed by the U. S. Department of Energy, the U. S. Nuclear Regulatory Commission and the U. S. Environmental Protection Agency.

Source of Radioactivity

In the shipboard reactors, pressurized water circulating through the reactor core picks up the heat of nuclear reaction. The reactor cooling water circulates through a closed piping system to heat exchangers which transfer the heat to water in a secondary steam system isolated from the primary cooling water. The steam is then used as the source of power for the propulsion plant as well as for auxiliary machinery. Releases from the shipboard reactors occur primarily when reactor coolant water expands as a result of being heated to operating temperature; this coolant passes through a purification system ion exchange resin bed prior to being transferred from the ship.

The principal source of radioactivity in liquid wastes is from trace amounts of corrosion and wear products from reactor plant metal surfaces in contact with reactor cooling water. Radionuclides with half-lives greater than one day in these corrosion and wear products include tungsten 187, chromium 51, hafnium 181, iron 59, iron 55, nickel 63, zirconium 95, tantalum 182, manganese 54, cobalt 58, and cobalt 60. The most predominant of these is cobalt 60, which has a 5.3 year half-life. Cobalt 60 also has the most restrictive concentration limit in water as listed by organizations which set radiological standards in references 19, 20, and 21 for these corrosion and wear radionuclides. Therefore, radioactive waste disposal is conservatively controlled by assuming that all the long-lived radioactivity is cobalt 60.

Radioactivity Removal From Liquid Wastes at Shore Facilities

Radioactive liquid wastes at shore facilities are collected in stainless steel tanks and processed through a processing system to remove most of the radioactivity (exclusive of tritium) prior to collection in a clean tank for reuse. Even after processing to approximately 10^{-8} microcuries of gamma radioactivity per milliliter, reactor coolant is reused rather than discharged. Figure 1 shows a simplified block diagram of the waste processing system which consists of particulate filters, activated carbon bed filters, mixed hydrogen hydroxyl resin and colloid removal resin beds. This type of processing system has been developed and used successfully to produce high quality water containing very low radioactivity levels.

Liquid Waste Releases in Harbors

The total amounts of long-lived gamma radioactivity released into harbors and seas within twelve miles from shore have been less than 0.002 curie during each of the last thirteen years. This total is for releases from U. S. Naval nuclear-powered ships and from the supporting shipyards, tenders and submarine bases, and at operating bases and home ports in the U. S. and overseas and all other U. S. and foreign ports which were visited by Naval nuclear-powered ships. This quantity is conservatively reported as if it consisted entirely of cobalt 60, which is the predominant long-lived gamma radionuclide and also has the most stringent concentration limits.

To put this small quantity of radioactivity into perspective, it is less than the quantity of naturally occurring radioactivity (reference 28) in the volume of saline harbor water occupied by a single nuclear-powered submarine.

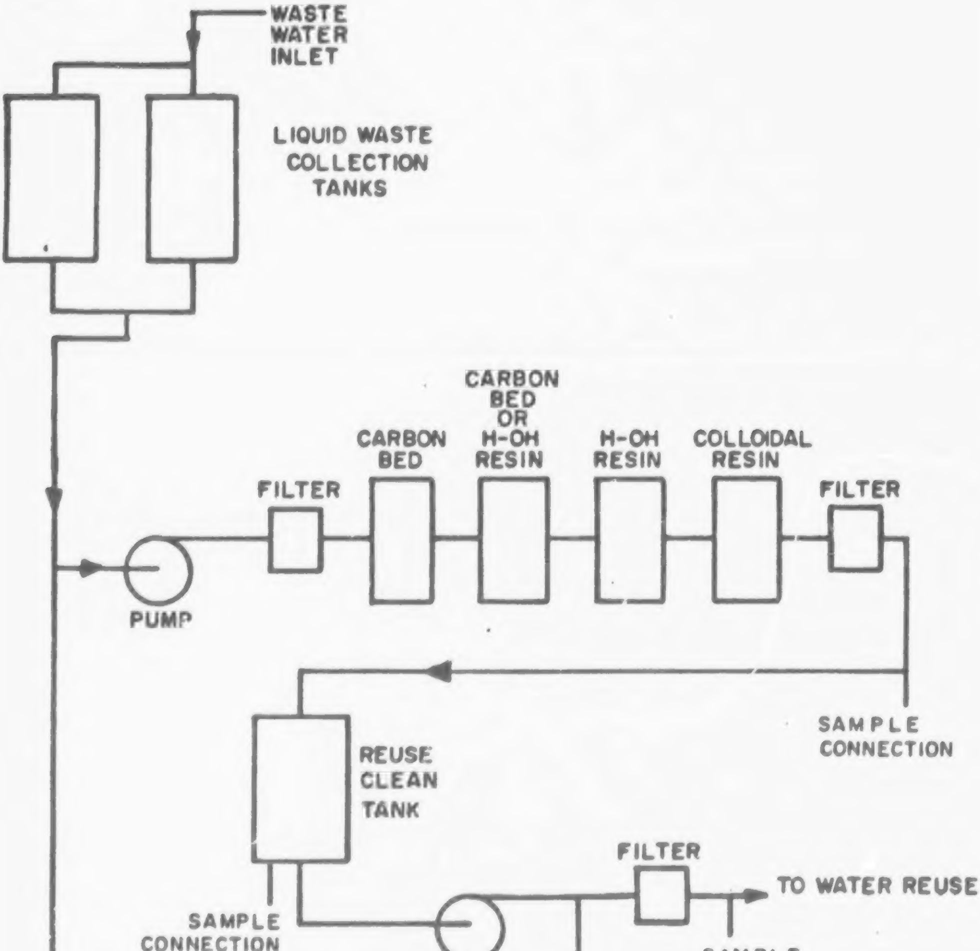
WASTE WATER INLET
LIQUID WASTE COLLECTION TANKS
CARBON BED OR H-OH RESIN
CARBON BED
H-OH RESIN
COLLOIDAL RESIN
FILTER
FILTER
PUMP
SAMPLE CONNECTION
REUSE CLEAN TANK
FILTER
TO WATER REUSE
SAMPLE CONNECTION
PUMP
SAMPLE CONNECTION
RECIRCULATION

FIGURE 1
SIMPLIFIED DIAGRAM OF WASTE PROCESSING SYSTEM

Although volumes are of less significance than the amounts of radioactivity released, Table 1 of earlier reports has also shown that the total volume of liquids released within twelve miles from shore has been reduced from millions of gallons per year in the 1960's to less than 25 thousand gallons per year beginning in 1973. Thus, the Navy has achieved its policy of reducing releases of radioactive liquids in harbors to the minimum practicable amounts. Therefore, volumes have been deleted from this report.

Short-Lived Radionuclides

Reactor coolant also contains short-lived radionuclides with half-lives of seconds to hours. Their highest concentrations in reactor coolant are from nitrogen 16 (7 second half-life), nitrogen 13 (10 minute half-life), fluorine 18 (1.8 hour half-life), argon 41 (1.8 hour half-life) and manganese 56 (2.6 hour half-life). Total short-lived radioactivity released in water in a year to any harbor has been less than 0.001 curie. For the longest-lived of these, about one day after discharge from an operating reactor, the concentration is reduced to one thousandth of the initial concentration, and in about two days the concentration is reduced to one millionth. Therefore, since most of the water is transferred to shore facilities for processing and reuse rather than discharged, these short-lived radionuclides are not important for water disposal considerations.

Fission Product Radionuclides

Fission products produced in the reactor are retained within the fuel elements. The fission gases krypton and xenon are also retained within the fuel elements. However, trace quantities of naturally occurring uranium impurities in reactor structural materials release small amounts of fission products to reactor coolant. The concentrations of fission products and the volumes of reactor coolant released are so low, however, that the total radioactivity attributed to long-lived fission product radionuclides, strontium 90 and cesium 137, in releases from U. S. Naval nuclear-powered ships and their support facilities has been less than 0.001 curie per year for all harbors combined. Fallout of these same fission products has often been more than this in one rainfall in a single harbor.

Tritium

Small amounts of tritium are formed in reactor coolant systems as a result of neutron interaction with the approximately 0.015 percent of naturally occurring deuterium present in water, and other nuclear reactions. Although tritium has a 12 year half-life, the radiation produced is of such low energy that the radioactivity concentration guide issued by the International Commission on Radiological Protection, the National Council on Radiation Protection and Measurements, the U. S. Nuclear Regulatory Commission and by other standard-setting organizations is one hundred times higher for tritium than for cobalt 60. This tritium is in the oxide form and is chemically indistinguishable from water; therefore, it does not concentrate significantly in marine life or collect on sediment as do other radionuclides.

Tritium is naturally present in the environment because it is generated by cosmic radiation in the upper atmosphere. Reference 29 reports that the production rate from this source is about six million curies per year, which through rainfall causes a tritium inventory in the oceans of about one hundred million curies. Because of this naturally occurring tritium, much larger releases of tritium than are conceivable from Naval nuclear reactors would be required to make a measurable change in the background tritium concentration.

The total amount of tritium released annually from all U. S. Naval nuclear-powered ships and their supporting tenders, bases and shipyards has been less than 200 curies. Most of this has been into the ocean greater than twelve miles from shore. The total tritium released from the entire nuclear Navy is less than single electrical generating nuclear power stations typically release each year (reference 30). Total tritium released into harbors within twelve miles from shore was less than one curie in 1983. Such releases are too small to increase measurably the tritium concentration in the environment. Therefore, tritium has not been combined with the data on other adionuclides in other sections of this report.

Carbon 14

Carbon 14 is also formed in small quantities in reactor coolant systems as a result of neutron interactions with nitrogen and oxygen. Carbon 14 decays with a half-life of 5,730 years; however, only low energy beta radiation is emitted as a result of this decay process. As a result, the radioactivity concentration guide for carbon 14 in its chemical form in air issued by the International Commission on Radiological Protection, the National Council on Radiation Protection and Measurements, the U. S. Nuclear Regulatory Commission and by other standard-setting organizations is three thousand times higher than for cobalt 60.

Carbon 14 occurs naturally in the environment. It is generated from cosmic radiation interactions with nitrogen and oxygen in the upper atmosphere and oxidized to form carbon dioxide. Carbon 14 is chemically indistinguishable from other isotopes of carbon. The carbon dioxide diffuses and convects throughout the atmosphere and enters the earth's carbon cycle. Reference 31 states that the earth's carbon 14 inventory is estimated to be about three hundred and ten million curies. The total amount of carbon 14 released annually from the operation of all U. S. Naval nuclear-powered ships and their supporting tenders, bases and shipyards has been less than 100 curies, most of which is released into the atmosphere at sea beyond twelve miles from shore. The total carbon 14 radioactivity released in a year in any harbor has been less than 0.1 curie. Since the inventory of naturally occurring carbon 14 is so large, it is extremely unlikely that releases from Naval nuclear reactors could result in a measureable change in the background concentration of carbon 14. Therefore, carbon 14 has not been combined with the data on other radionuclides in other sections of this report.

Liquid Waste Releases at Sea

Radioactive liquids incidental to the operation of the nuclear propulsion plants are released at sea under strict controls. These ocean releases are consistent with recommendations the Council on Environmental Quality made in 1970 to the President in reference 32, and consistent with the Marine Protection, Research and Sanctuaries Act, reference 33. Procedures and limits for ocean releases have been consistent with recommendations made by the National

Academy of Sciencies--National Research Council in reference 23 and by the International Atomic Energy Agency in reference 24. These releases have contained much less radioactivity than these reports considered would be acceptable. Total long-lived radioactivity excluding tritium released farther than twelve miles from shore by U. S. Naval nuclear-powered ships and supporting tenders is shown in Table 2 for recent years. This is the total amount released from over 100 ships at different times of the year in the open sea at long distances from land in small incremental amounts, and under rapid dispersal conditions due to wave action. The quantity of radioactivity released to the open ocean in 1983 was 0.4 curie, which is less than the naturally occurring radioactivity in a cube of sea water approximately 100 yards on a side.

TABLE 2 TOTAL RADIOACTIVITY IN LIQUID WASTE RELEASED AT SEA ORIGINATING FROM U. S. NAVAL NUCLEAR-POWERED SHIPS

	Radioactivity-Curies (less tritium)
1974	0.4
1975	0.4
1976	0.4
1977	0.4
1978	0.4
1979	0.4
1980	0.4
1981	0.4
1982	0.4
1983	0.4

Loss of USS THRESHER and USS SCORPION

Two U. S. Naval nuclear-powered submarines have been lost at sea in the Atlantic Ocean. The submarine THRESHER sank 10 April 1963, 100 miles from land in water 8,500 feet deep at latitude 41°45'N and longitude 65°00'W. The submarine SCORPION sank between 21 and 27 May 1968, 400 miles southwest of the Azores in more than 10,000 feet of water. The reactors used in all U. S. Naval submarines and surface ships are designed to minimize potential hazards to the environment even under the most severe casualty conditions such as actual sinking of the ship. First, the reactor core is so designed that it is physically impossible for it to explode like a bomb. Second, the reactor fuel elements are made of materials that are extremely corrosion resistant, even in sea water. The reactor core could remain submerged in sea water for decades without releases of fission products while the radioactivity decays, since the protective cladding on the fuel elements corrodes only a few millionths of an inch per year. Thus, in the event of a serious accident where the reactor is completely submerged in sea water, the fuel elements will remain intact for an indefinite period of time, and the radioactive material contained in these fuel elements should not be released. The maximum rate of release and dispersal of the radioactivity in the ocean, even if the protective cladding on the fuel were destroyed, would be so low as to be insignificant.

Radioactive material could be released from this type of reactor only if the fuel elements were actually to melt and, in addition, the high-strength, all-welded reactor system boundary were to rupture. The reactor's many protective devices and inherent self-regulating features are designed to prevent any melting of the fuel elements. Flooding of a reactor with sea water furnishes additional cooling for the fuel elements and so provides added protection against the release of radioactive fission products.

Radiation measurements, water samples, bottom sediment samples and debris collected from the area where THRESHER sank were analyzed for radioactivity shortly after the sinking and again in 1965 by various laboratories. Similarly, sea water and bottom sediment samples taken near SCORPION's hull were analyzed for radioactivity. In 1977, followup samples of water, sediment, marine life and debris were collected from the immediate THRESHER debris areas. In 1979, followup samples of water, sediment, marine life and debris were collected from the immediate SCORPION debris areas. None of these samples showed any evidence of release of radioactivity from the reactor fuel elements in either THRESHER or SCORPION. However, cobalt 60 released from both THRESHER and SCORPION coolant systems was detectable at low levels in sediment samples in the debris areas. The amount of cobalt 60 radioactivity in these samples was small compared to the naturally occurring radioactivity in the sediments. Based on the samples, less than 0.001 curie of cobalt 60 was estimated to be present in the sediment at either site. Cobalt 60 was not detectable in samples of water, marine life or debris. Thus, the THRESHER and SCORPION have not had a significant effect on the radioactivity in the environment. Additional information on the radiological surveys of the THRESHER and SCORPION debris areas is available in reference 34.

SOLID RADIOACTIVE WASTE DISPOSAL

During maintenance and overhaul operations, solid low-level radioactive wastes consisting of contaminated rags, plastic bags, paper, filters, ion exchange resin and scrap materials are collected by nuclear-powered ships and their support facilities. These low level radioactive materials from nuclear-powered ships are required to be strictly controlled to prevent loss. These controls include Naval accountability procedures which require serialized tagging and marking and signatures by radiologically trained personnel.

Solid radioactive waste materials are packaged in strong tight containers, shielded as necessary and shipped to burial sites licensed by the U. S. Nuclear Regulatory Commission or a State under agreement with the U. S. Nuclear Regulatory Commission. Solid radioactive materials from Naval nuclear-powered ships have not been dumped at sea since 1970 when the Navy issued procedures prohibiting sea disposal of solid radioactive materials. Shipyards and other shore facilities are not permitted to dispose of radioactive solid wastes by burial on their own sites.

Table 3 summarizes the total radioactivity and volumes of radioactive solid waste disposal for the last five years. Table 3 includes all waste generated by U. S. Naval nuclear-powered ships and the listed support facilities since all radioactive solid waste generated by U. S. nuclear-powered ships is transferred to the listed facilities. The quantity of solid radioactive waste in any one year from a particular facility depends on the amount and type of support work performed that year. Table 3 does not include expended fuel or radioactive material associated with expended fuel since expended fuel is shipped from the refueling shipyard by the Department of Energy to its facilities in Idaho for processing in the same manner as other expended nuclear fuel.

TABLE 3 RADIOACTIVE SOLID WASTE FROM U. S. NAVAL NUCLEAR-POWERED SHIPS AND THEIR SUPPORT FACILITIES FOR 1979 THROUGH 1983

Facility	1979		1980		1981		1982		1983	
	Thousand Cubic Feet	Curies	Thousand Cubic Feet	Curies	Thousand Cubic Feet	Curies	Thousand Cubic Feet	Curies	Thousand Cubic Feet	Curies
Kittery, Maine Portsmouth Naval Shipyard	3	3	2	3	2	9	1	< 1	1	< 1
Groton, New London, Conn. Electric Boat Division., Tender at State Pier, & Sub Base	4	< 1	3	< 1	1	< 1	1	< 1	2	< 1
Newport News, Virginia Newport News Shipbuilding	2	4	1	1	4	12	5	2	4	3
Norfolk, Virginia Naval Shipyard and Tenders	2	5	2	4	5	7	3	< 1	3	< 1
Charleston, South Carolina Naval Shipyard and Tenders	3	5	3	3	2	3	3	12	5	23
Pascagoula, Mississippi Ingalls Shipbuilding Div.	1	< 1	1	< 1	3	< 1				
San Diego, California Tenders	1	< 1	1	< 1	1	< 1	1	< 1	1	5
Vallejo, California Mare Island Naval Shipyard	2	22	6	36	2	16	2	6	5	49
Bremerton, Washington Puget Sound Naval Shipyard & Sub Base	7	3	5	21	7	11	6	32	9	15
Pearl Harbor, Hawaii Naval Shipyard & Sub Base	2	2	2	18	2	1	2	17	4	11
TOTAL	27	44	26	86	30	59	24	69	34	109

NOTES:

(1) This table includes all radioactive waste from tenders and nuclear-powered ships. This radioactivity is primarily cobalt 60. This radioactive waste is shipped to burial facilities licensed by the U. S. Nuclear Regulatory Commission or State.

(2) Volumes less than 500 cubic feet are reported 1 thousand and less than 0.5 curie is reported 1.

(3) The total volumes include 4000 cubic feet generated in 1979 and 1980 that were not shipped for disposal until 1981 due to temporary unavailability of burial facilities.

(4) The total volume for 1983 includes 5000 cubic feet that were generated but not shipped for disposal in 1982.

Figure 2 shows that in the last twelve years the total annual volume of solid low-level radioactive waste has been reduced by a factor of four despite increasing numbers of ships. Most of the volume is generated during maintenance and overhaul operations in shipyards. This reduction has been accomplished simultaneously with reduction in personnel radiation exposure, as described in reference 35. This reduction has been accomplished by several techniques including a total containment concept for radiological work which minimizes the spread of radioactivity to non-radioactive materials, use of preplanning and mockups to minimize rework, reusing rather than disposing of tools and equipment, use of liquid waste processing procedures which minimize depletion of processing media, use of compaction equipment and efficient packaging to fully use space in disposal containers, and separating solid waste that requires special disposal owing to its radioactive content from that which does not. The latter is achieved by work site controls and by use of sensitive detection equipment to detect radioactivity only slightly greater in concentration than that found in natural materials such as dirt, rocks, water, and biological matter (see reference 31) thus requiring the material to be handled as radioactive for waste disposal purposes. Material which passes the screening provided by this sensitive detection equipment can be disposed of as ordinary waste. Challenging goals are set by each shipyard to ensure continuing management attention to minimizing generation of waste in radiological work.

The annual volume for the entire Naval nuclear propulsion program could be contained in a cube measuring about ten yards on a side. The total annual volume of solid radioactive waste from the Naval nuclear propulsion program listed in Table 3 is less than some individual electrical generating nuclear power stations generate annually (reference 30). The total annual volume is approximately two percent of the solid radioactive waste generated annually by all nuclear electric power reactors (reference 30) and approximately one percent of the total volume of radioactive solid waste buried in all U. S. commercial burial grounds each year (reference 36).

Deactivation of Ingalls Shipbuilding Radiological Facilities

From 1958 to 1980, Ingalls Shipbuilding was engaged in the construction and overhaul of Naval nuclear-powered ships in Pascagoula, Mississippi. The shipyard radiological facilities which supported this work were deactivated

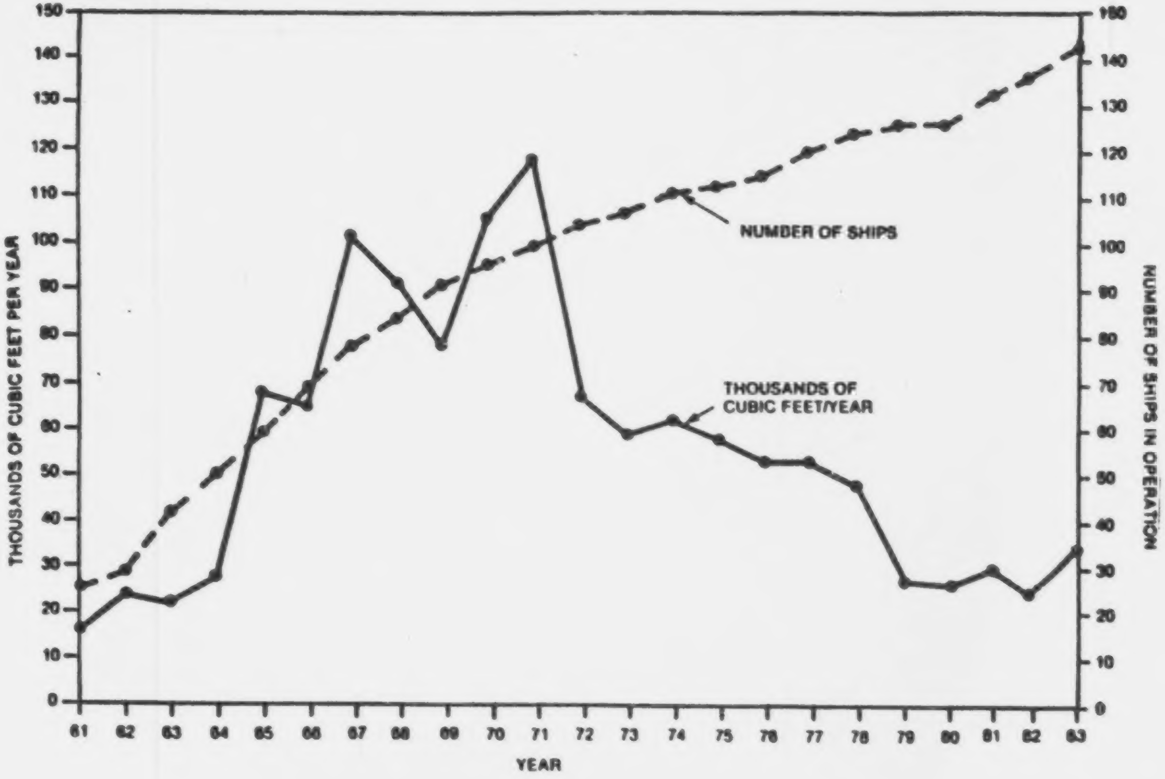

FIGURE 2

RADIOACTIVE SOLID WASTE DISPOSAL
VOLUMES IN THE NAVAL NUCLEAR
PROPULSION PROGRAM, 1961-1983

between 1980 and 1982 by removing and disposing of all radioactive material associated with Naval nuclear propulsion plants. Useful items, such as tools and equipment that were radioactively contaminated, were transferred to other organizations in the Naval Nuclear Propulsion Program. The remaining radioactive material was disposed of as solid radioactive waste.

Extensive radiological decommissioning surveys were performed to verify the removal of this radioactive material. Direct radiological surveys were performed on over 274,000 square feet of building and facility surfaces. Over 11,000 samples of these surfaces as well as soil, ground cover, and concrete were taken from all areas where radioactive work was previously performed. These samples were analyzed using sensitive laboratory equipment. In addition, both the State of Mississippi and the Environmental Protection Agency (reference 37) performed overcheck surveys of the deactivated facilities. After these surveys were completed, the Ingalls facilities were released for unrestricted use. Personnel who subsequently occupy these facilities will not receive any measurable radiation exposure above natural background levels that exist in areas not affected by Naval nuclear propulsion plant work. Reference 37 is the report of the survey of the Ingalls facilities by the Environmental Protection Agency.

TRANSPORTATION OF RADIOACTIVE MATERIAL

Shipments of radioactive materials in the Naval nuclear propulsion program are required to be made in accordance with applicable regulations of the U. S. Department of Transportation, U. S. Department of Energy, and U. S. Nuclear Regulatory Commission. The purpose of these regulations is to ensure that shipments of radioactive material are adequately controlled to protect the environment and the health and safety of the general public. These regulations are applicable to all radioactive material shipments including waste. The shipments discussed herein cover areas in addition to waste for completeness.

The above regulations provide requirements for the container design, certification, and identification as applicable for the specific quantity, type and form of radioactivity being shipped. Naval shipping container design requirements invoke shielding and integrity specifications and meet all regulatory requirements. They provide for testing of container designs, training and qualification of workers who construct containers, and quality control inspections during fabrication to ensure the containers will meet their design requirements.

In addition to imposing requirements of Federal transportation regulations, the Navy has issued standard instructions to further control shipments of radioactivity associated with U. S. Naval nuclear propulsion plants. These standard instructions result in a quality assurance program which includes inspections and assessments by independent organizations and senior management. Organizations making shipments are required to prepare local procedures which require use of compliance checklists and management review to ensure compliance with applicable Department of Transportation, Navy, and burial ground requirements. Only specially trained, designated people, knowledgeable in shipping regulations, are permitted to authorize shipments of radioactive material.

Protective transportation service such as signature security service or sealed shipping vehicles are required for these shipments to ensure point-to-point control and traceability of each shipment from shipper to receiver. A readily accessible log of all shipments in transit is maintained to enable prompt identification and provide the basis for advice on the nature of the shipment. Return receipts are required to be made in writing by receivers to ensure that radioactive material has not been lost in shipment. Receipt inspection of containers of radioactive material and accompanying documents are required promptly after receipt to monitor compliance. Even minor discrepancies from detailed shipping regulations are required to be reported to the shipper so that correction can be made in future shipments. This is done to ensure compliance with shipping regulations.

Radioactive materials shipped in the Naval nuclear propulsion program include anticontamination clothing for laundry, small sealed sources used for calibrating radiation monitoring instruments, tools and equipment used for radioactive work, low-level radioactive waste, radioactive components and new and spent nuclear fuel. A total of approximately 1,000 shipments are made annually by Naval nuclear-powered ships and their support facilities, which is a small part of the approximately two million shipments of radioactive materials made annually in the United States (Reference 38).

Nearly all radioactive shipments in the Naval nuclear propulsion program contain only low-level radioactivity classified under Department of Transportation regulations as low specific activity or limited quantity shipments. The predominant radionuclide associated with these shipments is cobalt 60 in the form of insoluble metallic oxide corrosion products attached to surfaces of materials inside shipping containers. Most low-level shipments are made by truck. Air transport is used no more than a few times per year for the Naval nuclear propulsion program. These air shipments involve only very low-level radioactivity and are not shipped on passenger planes.

Nearly one-quarter of the low-level radioactivity shipments are minute quantities in sealed instrument calibration check sources. These sources contain insignificant quantities of radioactivity which are comparable to the radioactivity in typical ionization type smoke detectors. Approximately 65 percent of the shipments are anticontamination clothing, equipment and tools. The anticontamination laundry involves shipments of special outer clothing potentially contaminated with low-levels of radioactivity while worn in controlled work areas. This laundry is shipped by Nuclear Regulatory Commission licensed contractors to their facilities for cleaning. On the average, one shipment of low-level radioactive waste per three months is made from each facility listed in Table 3.

The remaining few shipments are new and spent nuclear fuel and radioactive components associated with spent nuclear fuel and are shipped by the U. S. Department of Energy. Such shipments are made infrequently since U. S. Naval nuclear-powered ships need refueling infrequently. Spent nuclear fuel shipments are made to Department of Energy facilities for disposition. Measures are carried out to assist in safeguarding these shipments and assuring they reach their destination. Each spent fuel shipment is escorted by U. S. Government representatives and each shipping container is specifically designed to withstand extreme accident impacts, fire, or water immersion, and to prevent release of the material to the environment in the event of an accident. The cargo in the nuclear fuel and radioactive component shipments is non-explosive and non-flammable and, in addition, the radioactive material in the radioactive components is in an insoluble form that should not be dispersed even in the event of an accident.

Estimates of radiation exposure to transportation crews and the general public from shipments of radioactive materials in the Naval nuclear propulsion program have been made in a manner consistent with that employed by the U. S. Nuclear Regulatory Commission in reference 38. Based on comparisons of the types and numbers of radioactive shipments made, the total annual radiation exposure to all transportation crews for all shipments is estimated to be less than three man-rem. If one person were to receive all this exposure, he would not exceed the radiation exposure permitted for an individual worker by the U. S. Nuclear Regulatory Commission. The total estimated radiation exposure accumulated by the public along transportation routes is not more than a few times higher than the exposure to transportation workers. The maximum exposure to any individual member of the public would be far less than received from natural radiation.

Shipments of radioactive materials associated with Naval nuclear propulsion plants have not resulted in any measurable release of radioactivity to the environment. There have never been any significant accidents involving release of radioactive material during shipment since the Naval nuclear propulsion program began. In general, the few accidents that have occurred involved incidents such as broken truck axles or slight external damage to a shipping container with no release of radioactivity. In one incident a train collision resulted in minor denting of a new fuel shipping container with no loss of integrity of the container, no damage to the fuel and no release of radioactivity. In the only two instances that involved loss of contents, one quart containers holding samples were broken in shipment. In one case this occurred when a cargo aircraft crashed. The other container was lost from a commercial ship. Both containers were recovered and there was no measurable radioactivity released since the original contents were less than one millionth of a curie, too small to be measurable in the environment.

The requirements of the Naval nuclear propulsion program specify that the carriers for all radioactive material shipments shall have accident plans which identify the actions to be taken in the event the transportation vehicle is involved in an accident. These plans provide for notification of civil authorities and the originating facility. The U. S. Navy would communicate with and cooperate fully with State radiological officials in the event of occurrences involving shipment of radioactive materials.

ENVIRONMENTAL MONITORING

To provide additional assurance that procedures used by the U. S. Navy to control radioactivity are adequate to protect the environment, the Navy conducts environmental monitoring in harbors frequented by its nuclear-powered ships. Environmental monitoring surveys for radioactivity are periodically performed in harbors where U. S. Naval nuclear-powered ships are built or overhauled and where these ships have home ports or operating bases. Samples from each harbor monitored are also checked at least annually by a U. S. Department of Energy laboratory to ensure analytical procedures are correct and standardized. The Department of Energy laboratory results have been consistent with shipyard and operating base results.

Navy Environmental Monitoring Program

The current Navy environmental monitoring program consists of analyzing samples of harbor water and sediment, supplemented by shoreline surveys, posted dosimeters and effluent monitoring. Sampling harbor water and sediment each quarter year is emphasized since these materials would be the most likely affected by releases of radioactivity. Marine life samples have also been collected from some harbors.

At least five water samples are taken in each harbor once each quarter year in areas where nuclear-powered ships berth and from upstream and downstream locations. These samples are analyzed for gross gamma radioactivity and for cobalt 60 content. A solid state lithium-drifted germanium detector with a multichannel analyzer is used to measure gross gamma radioactivity in an energy range from 0.1 MeV to 2.1 MeV expressed in terms of cobalt 60 equivalent and to analyze the resulting gamma data for the presence of cobalt 60. Procedures for analysis will detect cobalt 60 if its concentration exceeds the U. S. Environmental Protection Agency drinking water limits of reference 27. No cobalt 60 has been detected in any of the water samples from all harbors monitored.

A radiological laboratory of the Environmental Protection Agency has analyzed samples from harbors to identify radionuclides present in sediment. These analyses showed cobalt 60 was the predominant radionuclide added to sediment from Naval nuclear reactor operations. Therefore, Navy monitoring procedures require collecting in each harbor approximately 20 to 120 sediment samples once each quarter year for cobalt 60 and gross gamma analyses. Locations and numbers of sediment samples for a particular harbor depend on the size of the harbor and the number and separation of locations where nuclear-powered ships berth. Sampling points are selected to form a pattern around ship berthing locations and to provide points in areas away from these berthing locations. The sampling locations are selected individually for each harbor considering characteristics of the harbor. Sediment samples are collected using the dredge show in Figure 3. The dredge samples a surface area of 36 square inches and has been modified to collect only the top one-half to one inch of sediment. The top layer was selected because it should be more mobile and more accessible to marine life than deeper layers. After the dredge is lowered to the harbor bottom, the messenger weight is lowered on the support line from the surface and causes the spring-loaded jaws on the dredge to close and trap the sediment. The samples are placed directly into a Marinelli container for analysis. Each sediment sample is analyzed for gamma radioactivity in the container in which it is collected using the lithium-drifted germanium detector with a multichannel analyzer. The sediment samples are not dried prior to analysis but excess water is drained off. Gross gamma radioactivity in an energy range from 0.1 MeV to 2.1 MeV is expressed in terms of equivalent cobalt 60 and the resulting gamma data is analyzed for the presence of cobalt 60 radioactivity. Results of the sediment samples from harbors monitored by the Navy in the U. S. and possessions for 1983 are summarized in Table 4.

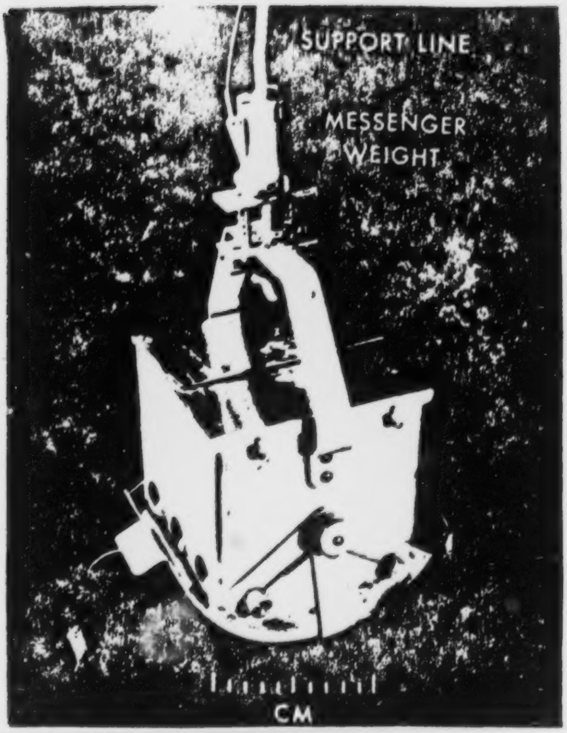

FIGURE 3
DREDGE FOR SAMPLING HARBOR SEDIMENT

Evaluation of the data summarized in Table 4 shows that low-level cobalt 60 radioactivity in harbor bottom sediment is detected around a few operating base and shipyard piers where nuclear-powered ship maintenance and overhauls have been conducted over a period of several years. The radioactivity detected is from operations in the early 1960's since releases such as shown earlier in Table 1 are too small to be detectable in the harbors. Cobalt 60 is not detectable above background levels in general harbor bottom areas away from these piers. Maximum total radioactivity observed in a U. S. harbor is less than 0.05 curie of cobalt 60. This radioactivity is small compared to background. Based on the typical concentrations of naturally occuring radioactivity such as potassium 40, radium, uranium and thorium which are described in reference 28 for marine sediment, the natural radioactivity in the sediment of a typical harbor amounts to hundreds of curies. Comparison to previous environmental monitoring data in references 1 through 18 shows that these environmental cobalt 60 levels have been steadily decreasing.

TABLE 4 SUMMARY OF 1983 SURVEYS FOR COBALT 60 in BOTTOM SEDIMENT OF U. S. HARBORS WHERE U. S. NAVAL NUCLEAR-POWERED SHIPS HAVE BEEN REGULARLY BASED, OVERHAULED OR BUILT

	Number of Samples with Cobalt 60			Total Bottom Area with Cobalt 60 over 3×10^{-6} μCi/gm** (Square Kilometers)	Estimated Total *** Cobalt 60 in Top Layer of Sediment (Curies)
	less than $3\text{x}10^{-6}$μCi/gm*	3 to 30x 10^{-6}μCi/gm	Greater than 30x 10^{-6}μCi/gm		
Kittery, Maine Portsmouth Naval Shipyard	176	0	0	0	ND
Groton, New London, Conn. Electric Boat Division, State Pier and Sub Base	510	0	0	0	0.01
Newport News, Virginia Newport News Shipbuilding	152	0	0	0	ND
Norfolk, Virginia Naval Shipyard and Base	256	0	0	0	ND
Charleston, South Carolina Naval Shipyard and Bases	216	0	0	0	ND
St. Marys, Georgia	92	0	0	0	ND
San Diego, California Navy Piers	256	0	0	0	ND
Vallejo, California Mare Island Naval Shipyard	120	0	0	0	ND
Bremerton, Washington Naval Shipyard and Base	344	0	0	0	ND
Pearl Harbor, Hawaii Naval Shipyard and Sub Base	184	0	0	0	ND
Apra Harbor, Guam	128	0	0	0	ND
Port Canaveral, Florida	80	0	0	0	ND

NOTE: *Minimum detectable radioactivity is approximately 0.2 millionths of a microcurie per gram. $1\mu\text{Ci} = 1 \times 10^{-6}$ Ci

**One square kilometer is approximately equal to 0.4 square mile.

***Where total cobalt 60 in the surface sediment layer is less than 0.01 curie, ND is reported. Samples more than one foot deep from several harbors show that total cobalt 60 present may be two to five times that measured in the surface layer.

The first data column in Table 4 includes all samples with less than 3 millionths of a microcurie of cobalt 60 per gram of sediment. Most of the sediment samples did not contain detectable cobalt 60 and all of them are tabulated in this range. In this range cobalt 60 is comparable to the levels of naturally occurring radioactivity such as potassium, radium, uranium and thorium. Cobalt 60 in sediment in this low range may also be detectable as a result of world wide dispersion from atmospheric nuclear weapons testing.

The value of 30 millionths of a microcuries per gram was selected for the top of the second range of data in Table 4. A measure of the significance of this range is that if all a person's food were to contain cobalt 60 in this range of radioactivity throughout the year, he would not exceed radiation exposure levels permitted in references 19, 20, and 21 for members of the general public. None of the sediment samples are in this second range, and none of the samples exceeded this range in 1983. Data on uptake of this cobalt 60 by marine life obtained to date show that in the salt water harbor bottom environments, no significant buildup of cobalt 60 occurs in marine life. An Environmental Protection Agency evaluation in reference 39 shows that the cobalt 60 from Naval nuclear propulsion plants is in the form of metallic corrosion product particles which do not appear to be concentrated in the food chain. Because of the nature of the radioactivity and the low concentrations noted in Table 4, extensive monitoring of radioactivity in marine life has not been necessary as part of routine environmental monitoring programs in these harbors.

In addition to Navy analysis of environmental samples, at least two sediment samples from each harbor monitored have been sent each year to a U. S. Department of Energy laboratory, as a check of Navy results. This Department of Energy laboratory provides a further check on the quality of environmental sample analyses by participating in the quality control programs sponsored by the Department of Energy and the Environmental Protection Agency.

The check samples were analyzed for gamma radionuclides in a manner similar to Navy procedures but with greater sensitivity. Figure 4 depicts the gamma spectra for two such samples. Both spectra show the presence of abundant naturally occurring radionuclides which contribute to measured radioactivity even if cobalt 60 were not present. The upper spectrum is for a sample to which cobalt 60 has

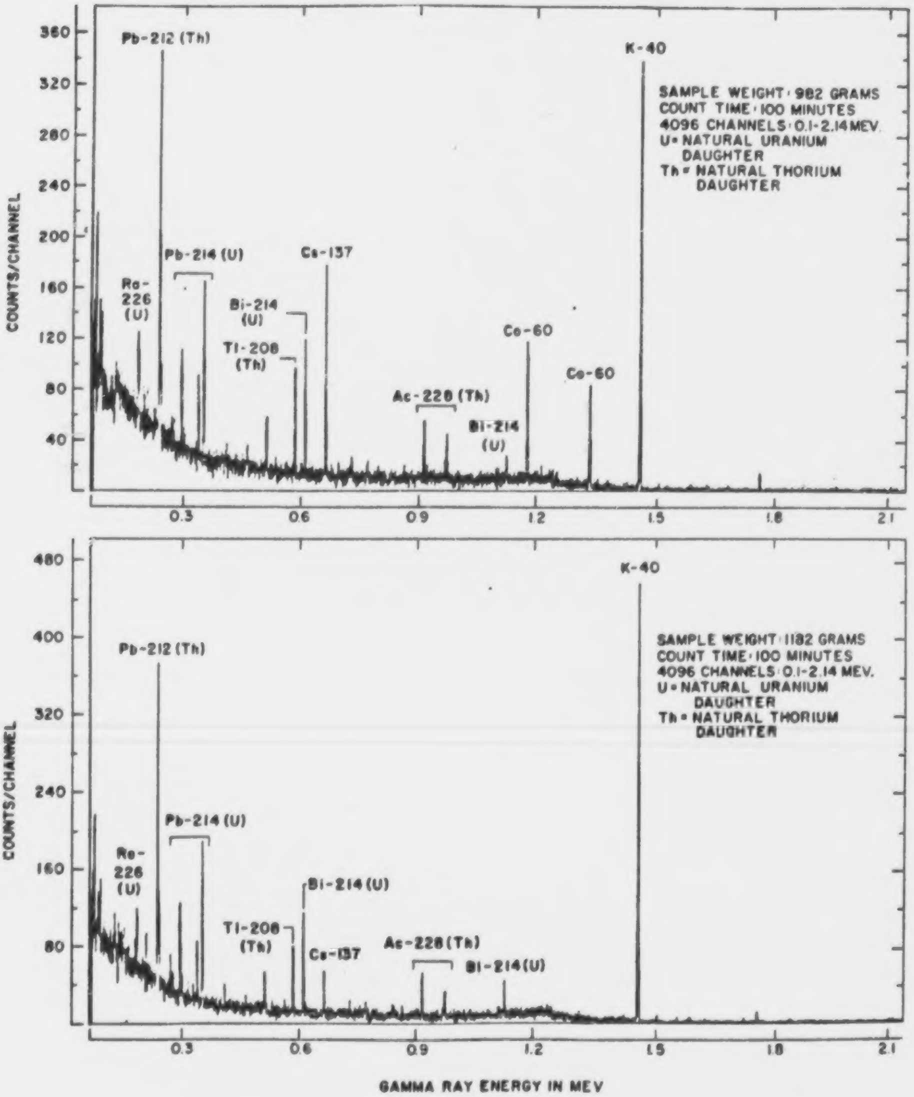

FIGURE 4 GAMMA SPECTRA OF HARBOR BOTTOM SEDIMENT SAMPLES WITH LITHIUM-DRIFTED GERMANIUM DETECTOR

been added to a concentration of approximately 3 millionths of a microcurie per gram and shows easily recognizable energy peaks due to the presence of this small concentration of cobalt 60. The lower spectrum depicts the appearance of most of the sediment samples in the first column in Table 4.

In addition to the extensive quarterly monitoring of harbor water and sediment, samples of marine life such as mollusks, crustaceans and marine plants have been collected in 1983 from most harbors monitored. Marine life samples are also analyzed using a lithium-drifted germanium detector with a multi-channel analyzer. No buildup of cobalt 60 associated with U. S. Naval nuclear-powered ships has been detected in these samples of marine life. In the course of sampling underwater sea growth that accumulates on the pilings of piers in warmer harbors, low concentrations of cobalt 60 similar to levels of radionuclides found in natural materials have been found in a few isolated cases. Follow-up sampling in these few cases has shown no continuing presence of cobalt 60 indicating that the cobalt 60 does not concentrate in the organisms that make up the sea growth.

For comparison, references 40 and 41 contain evaluations by laboratories of the Environmental Protection Agency and of the Department of Energy of the effects on the environment from the accumulation near points of discharge of radionuclides from several nuclear facilities. The referenced reports conclude for these other facilities that radioactivity levels much greater than shown in Table 4 have caused no significant radiation exposure to the general public.

In all monitored harbors, twice per year shoreline areas uncovered at low tide are surveyed for radiation levels with sensitive scintillation detectors to determine if any radioactivity from bottom sediment washed ashore. All results were the same as background radiation levels in these regions, approximately 0.01 millirem per hour. Thus, there is no evidence in these ports that these areas are being affected by nuclear-powered ship operations.

Ambient radiation levels are measured using sensitive thermoluminescent dosimeters continuously posted at locations outside the boundaries of areas where radioactive work is performed. These dosimeters are also posted at locations remote from support facilities to measure background radiation from natural radioactivity. Results of dosimeters posted at support facilities between radiologically controlled areas and the general public are compared with dosimeters posted at remote background locations up to several miles away. These results showed that radiation exposure to the general public from radioactive work on Naval nuclear propulsion plants has not increased above that received from natural background radiation.

Naval nuclear reactors and their support facilities are designed to ensure there are no significant discharges of radioactivity in airborne exhausts. Radiological controls are exercised in support facilities to preclude exposure of working personnel to airborne radioactivity exceeding limits for the general population specified in reference 19. These controls include a total containment concept for radioactive materials and provide a barrier to prevent significant radioactivity from becoming airborne. Further, all air exhausted from these facilities is passed through high efficiency particulate air filters and monitored during discharge. Comparison of sensitive airborne radioactivity measurements in shipyards demonstrates that air exhausted from facilities actually contained a smaller amount of radioactivity than this same air contained when it was drawn from the environment into the facilities. There were no discharges of airborne radioactivity above concentrations normally present in the atmosphere.

ENVIRONMENTAL PATHWAYS ANALYSIS

Results of monitoring of environmental samples described above have shown that environmental radioactivity levels have not been changed appreciably and therefore radiation exposure to the public from operations of nuclear-powered ships and their support facilities is too low to measure. Nevertheless, a detailed analysis has been performed to provide a quantitative estimate of the radiation exposure to which any member of the general public might be exposed as a result of radioactivity in liquid and airborne effluents.

This analysis has been performed in a conservative manner which ensures that the estimated exposure is higher than any actual exposure would be. For example, the sites chosen for analysis were shipyards since the amount of radiological work at these facilities is considerably higher than at other types of support facilities. Quantities of radioactivity from shipyard releases used in this analysis are higher than have been measured from any shipyard in the last five years. Values of environmental parameters including meteorological conditions and radionuclide concentration factors have been chosen to provide conservative results. In addition, the analysis assumes the individual receiving the maximum exposure is located right at the site boundary. Thus, the actual exposures to members of the public are expected to be lower than the results of this analysis.

The environmental pathways which were considered are depicted in Figure 5, which is based on reference 21. The hypothetical releases assumed are listed in Table 5. Table 6 shows the assumed usage parameters which are based on reference 42. Concentration factors for radionuclides in the marine environment were assumed as published in reference 43 and are also in Table 6. The pathways analysis, including meteorology, population distribution, and radiological exposure rates was performed in a manner consistent with that employed by the U. S. Nuclear Regulatory Commission in reference 42.

Results of the analysis are summarized in Tables 7 and 8. Table 7 compares the estimated maximum exposure to a member of the public with guidelines of the Nuclear Regulatory Commission, although these guidelines are not applicable to nuclear-powered ships and their support facilities. These numerical guidelines on calculated radiation exposures have been issued by the Nuclear Regulatory Commission in reference 26 for implementing the concept that radioactivity in effluents from light water nuclear electric power reactors should be limited to amounts and quantities as low as reasonably achievable. These numerical guidelines of the Nuclear Regulatory Commission are consistent with environmental standards for the uranium nuclear fuel cycle issued by the Environmental Protection Agency in reference 44. Table 8 presents the estimated total whole body radiation exposure to the total population within 50 miles from the assumed radioactivity releases compared with the radiation exposure received by the same population from natural background radioactivity, as reported in references 25, 31 and 45. As shown in Tables 7 and 8, conservative estimates of the exposures to members of the public from the Naval nuclear propulsion program are far less than either the Environmental Protection Agency standards, the guidelines of the Nuclear Regulatory Commission or the exposure from natural background radioactivity.

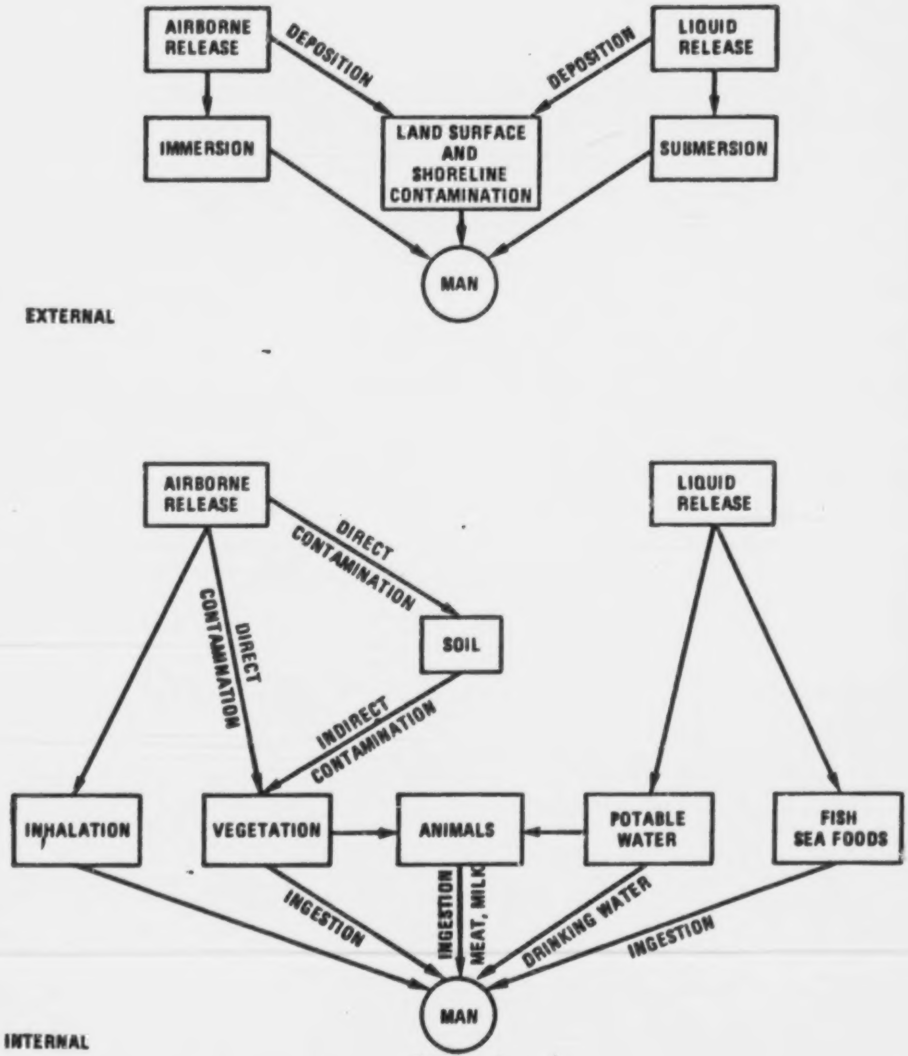
AIRBORNE RELEASE
DEPOSITION
DEPOSITION
LIQUID RELEASE
IMMERSION
LAND SURFACE AND SHORELINE CONTAMINATION
SUBMERSION
MAN
EXTERNAL
AIRBORNE RELEASE
DIRECT CONTAMINATION
DIRECT CONTAMINATION
LIQUID RELEASE
SOIL
INDIRECT CONTAMINATION
INHALATION
VEGETATION
ANIMALS
POTABLE WATER
FISH SEA FOODS
INGESTION
INGESTION
MEAT, MILK
DRINKING WATER
INGESTION
MAN
INTERNAL

FIGURE 5

PATHWAYS FOR EXTERNAL AND INTERNAL EXPOSURE OF MAN FROM AIRBORNE AND LIQUID RELEASES OF RADIOACTIVE EFFLUENTS

TABLE 5 RADIONUCLIDE RELEASES ASSUMED FOR ENVIRONMENTAL PATHWAYS ANALYSIS

	Assumed Annual Release, Curie	
Radionuclide	Liquid Release	Airborne Release
Cobalt 60	0.001	0.001
Tritium	0.100	0.001
Carbon 14	*	0.100
Krypton 83m	*	0.020
Krypton 85m	*	0.024
Krypton 87	*	0.050
Krypton 88	*	0.020
Xenon 131m	*	0.005
Xenon 133m	*	0.010
Xenon 133	*	0.210
Xenon 135	*	0.250
Argon 41	*	0.410

*These gaseous radionuclides are released into the air, not into water.

TABLE 6 ENVIRONMENTAL EXPOSURE TIMES, CONSUMPTION AND CONCENTRATION PARAMETERS ASSUMED FOR ENVIRONMENTAL PATHWAYS ANALYSIS

Pathway Parameter*	Assumed Parameter Value For Highest Individual	 For Average Individual
Fraction of Year Occupancy		
For Air Immersion	1	1
For Land Deposition	1	1
Along Shoreline	.05	.0005
Swimming	.01	.0001
Boating	.01	.0001
Food Consumption		
Leafy vegetables, Kg/year	72	18
Water, liters/year	730	180
Fish,** Kg/year	18	2.3
Mollusks,** Kg/year	9	.25
Crustacea,** Kg/year	9	.90
Sediment, Kg/year	1	.10

* Refer to Figure 5

** Cobalt 60 was assumed to concentrate from sea water to the edible flesh of fish, mollusks, and crustacea by factors as follows: fish, 650; mollusks, 170; crustacea, 1,700, based on reference 43.

TABLE 7 ESTIMATED MAXIMUM RADIATION EXPOSURE TO AN INDIVIDUAL FOR ASSUMED LIQUID AND AIRBORNE RADIOACTIVITY RELEASES FROM SHIPYARDS ENGAGED IN NAVAL NUCLEAR PROPULSION WORK

	Maximum Exposure To An Individual	
	NRC Guideline millirem/year	Estimated Value millirem/year
From Radionuclides In Liquid Releases	5 whole body, or any organ	less than 1
From Gaseous Radionuclides In Airborne Releases	5 whole body, or 15 skin	less than 1
From Other Radionuclides In Airborne Releases	15 any organ	less than 1

TABLE 8 ESTIMATED TOTAL WHOLE BODY RADIATION EXPOSURE TO GENERAL PUBLIC WITHIN 50 MILES FOR ASSUMED LIQUID AND AIRBORNE RADIOACTIVITY RELEASES FROM SHIPYARDS ENGAGED IN NAVAL NUCLEAR PROPULSION WORK

Exposure Due to Natural Background Radiation	Exposure Due to Assumed Radioactive Releases
Approximately 100,000 man rem per year	less than 1 man rem per year

AUDITS AND REVIEWS

The requirements and procedures for control of radioactive waste are important parts of the training programs for everyone involved with radioactivity in the Naval nuclear propulsion program. Such training is part of the initial qualification of shipyard workers and of Naval personnel assigned to ships and bases, and is required to be repeated regularly. Emphasis on this training is part of the concept that radiological control personnel alone cannot cause radiological work to be well performed; production and operations personnel and all levels of management are required to be involved in the control of radioactivity.

Checks and balances of several kinds are also set up to help ensure control of radioactivity. First, written procedures exist which require verbatim compliance. Radiological control personnel monitor various steps in radioactive waste processing. In each shipyard an independent organization, separate from the radiological control organization, audits all aspects of radioactive waste processing. Audits are performed by representatives from Naval Reactors headquarters who are assigned full time at each shipyard. Radiological control personnel from headquarters also conduct periodic inspections of each shipyard. In addition, shipyards have made detailed assessments of the environmental effects of shipyard operations and have published reports on the results of these assessments. Similarly, there are multiple levels of audits and inspections for the other Navy shore facilities, tenders, and nuclear-powered ships and for other radiologically controlled functions such as transportation. Even the smallest audit findings are followed up to ensure proper recovery and permanent corrective actions are taken and to help minimize the potential for future deficiencies.

The policy of the Navy is to provide for close cooperation and effective communication with state radiological officials involving occurrences that might cause concern because of radiological effects outside the ships or shore facilities. The Navy has reviewed radioactive waste disposal, radiological environmental monitoring, transportation and other radiological matters with state radiological officials in the states where Navy nuclear-powered ships are based or overhauled. Although there were no occurrences in 1983 which resulted in radiological effects to the public outside these facilities, states were notified when inquiries showed public interest in the possibility that such events had occurred. The Navy has encouraged states to conduct independent radiological environmental monitoring in harbors where Naval nuclear-powered ships are based or overhauled; the results of monitoring by states have been consistent with Navy results.

The U. S. Environmental Protection Agency (EPA) has conducted detailed reviews of the Navy's procedures for controlling radioactive waste and for radiological environmental monitoring. An Environmental Protection Agency laboratory has conducted detailed environmental surveys of selected U. S. harbors (references 37, 39, 46, 47, 48, 49, 50). This laboratory has performed these surveys in the harbors at Pascagoula, Mississippi; Charleston, South Carolina; Pearl Harbor, Hawaii; San Diego, California; Vallejo, California; New London, Connecticut; Newport News, Virginia; Norfolk, Virginia; Bremerton, Washington; and Kittery, Maine-Portsmouth, New Hampshire. Environmental Protection Agency results have been consistent with Navy results. In the latest such Environmental Protection Agency survey of an operating shipyard conducted in 1977 at the Portsmouth Naval Shipyard, the Environmental Protection Agency analyzed harbor water, sediment, marine life and air for radioactivity. No radioactivity from shipyard operations was detected.

CONCLUSIONS

1. The total gamma radioactivity in liquids, less tritium, released into all ports and harbors from the U. S. Naval nuclear propulsion program was less than 0.002 curie in 1983. The total tritium released into all ports and harbors was less than one curie in 1983.

2. No increase of radioactivity above normal background levels has been detected in harbor water where U. S. Naval nuclear-powered ships are based, overhauled, or constructed.

3. Liquid waste from U. S. Naval nuclear-powered ships and their support facilities have not caused a measurable increase in the general background radioactivity of the environment.

4. Low-level cobalt 60 radioactivity in harbor bottom sediment is detectable around a few operating base and shipyard piers from low level liquid releases in the 1960's. Cobalt 60 is not detectable above background levels in general harbor bottom areas away from these piers. Maximum total radioactivity observed in a U. S. harbor of less than 0.05 curie of cobalt 60 is small compared to the naturally occurring radioactivity. Comparison to previous environmental data summarized in references 1 through 18 shows that these environmental cobalt 60 levels are continuing to decrease.

5. Conservative estimates of radiation exposures to members of the public from the Naval nuclear propulsion program are far less than either the Environmental Protection Agency environmental standards, the guidelines of the Nuclear Regulatory Commission or the exposure from natural background radioactivity.

6. Procedures used by the Navy to control discharges of radioactivity from U. S. Naval nuclear-powered ships and their support facilities have been effective in protecting the environment and the health and safety of the general public. Independent radiological environmental monitoring performed by the U. S. Environmental Protection Agency and states have confirmed the adequacy of these procedures.

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APPENDIX
ENVIRONMENTAL MONITORING SURVEY CHARTS

Environmental monitoring survey charts for harbors monitored for radioactivity associated with U. S. Naval nuclear-powered ships in the U. S. and possessions during 1982 are listed below and included in this appendix. The sampling locations for harbor water and harbor sediment are shown. In addition, shoreline survey areas and the locations of posted dosimetry devices are shown on the figures.

Figure No.	Location
	California
1	U. S. Naval Air Station, Alameda
2	Hunters Point Shipyard, San Francisco
3	Mare Island Naval Shipyard, Vallejo
4	San Diego Harbor
5	San Diego Harbor, Ballast Point Area
	Connecticut
	Electric Boat Division, Groton
7	U. S. Naval Submarine Supoort Facility, New London Harbor
8	State Pier Area, New London
	Florida
9	Port Canaveral
	Georgia
10	U. S. Naval Submarine Support Facility, Kings Bay, St. Marys
	Guam
11	Apra Harbor
	Hawaii
12	Pearl Harbor Area
13	Pearl Harbor Naval Shipyard
14	U. S. Naval Submarine Base, Pearl Harbor
	New Hampshire/Maine
15	Portsmouth Naval Shipyard
	South Carolina
16	U. S. Naval Station and Naval Shipyard, Charleston
17	U. S. Naval Weapons Station, Charleston

Virginia

18 Newport News Shipbuilding and Dry Dock Co., Newport News

19 Norfolk Naval Shipyard, Portsmouth

20 U. S. Naval Station Norfolk, Destroyer and Submarine Piers

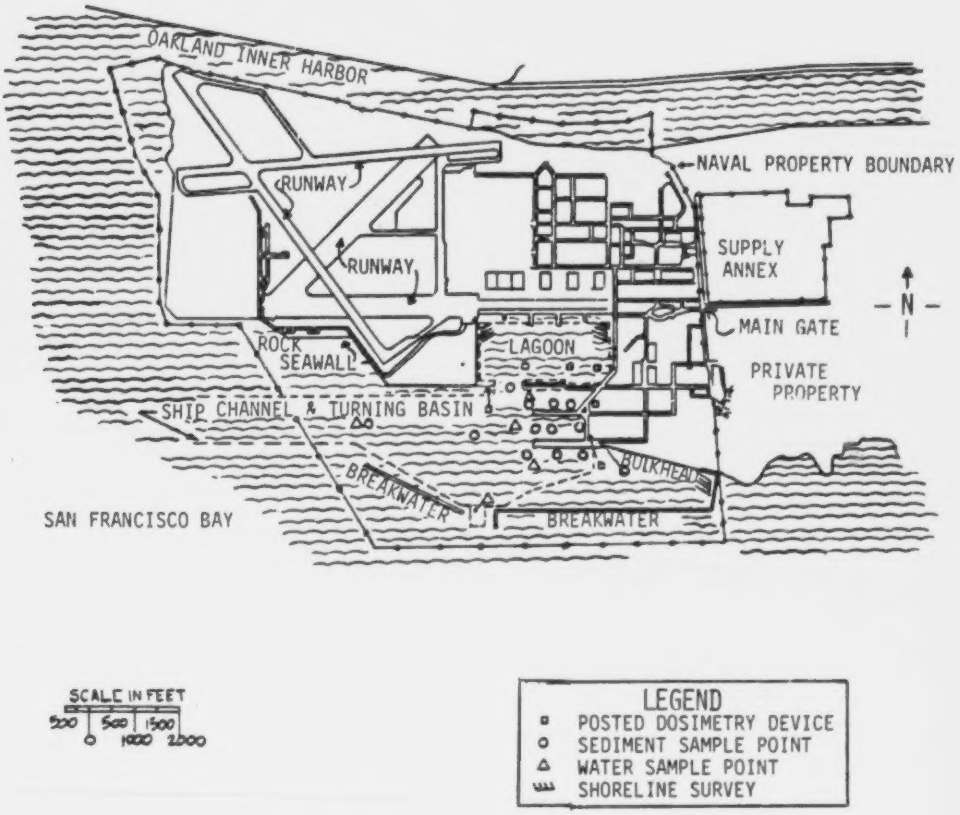
21 Norfolk—Portsmouth Virginia Area

Washington

22 Puget Sound Naval Shipyard

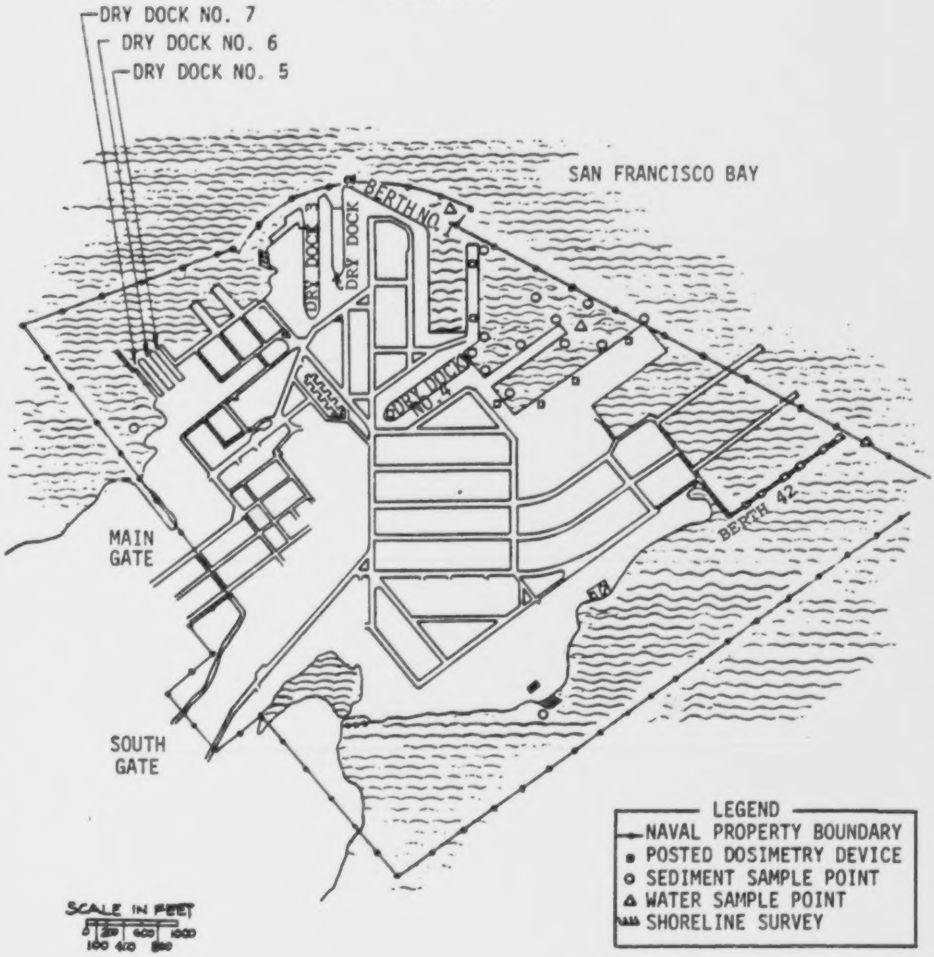
23 Bangor/Hood Canal

FIGURE 1
ENVIRONMENTAL MONITORING LOCATIONS
AT THE U. S. NAVAL AIR STATION
ALAMEDA, CALIFORNIA


OAKLAND INNER HARBOR
RUNWAY
RUNWAY
NAVAL PROPERTY BOUNDARY
SUPPLY ANNEX
N
MAIN GATE
PRIVATE PROPERTY
LAGOON
ROCK SEAWALL
SHIP CHANNEL & TURNING BASIN
BULKHEAD
BREAKWATER
BREAKWATER
SAN FRANCISCO BAY
SCALE IN FEET
500 500 1500
0 1000 2000
LEGEND
▪ POSTED DOSIMETRY DEVICE
○ SEDIMENT SAMPLE POINT
△ WATER SAMPLE POINT
SHORELINE SURVEY

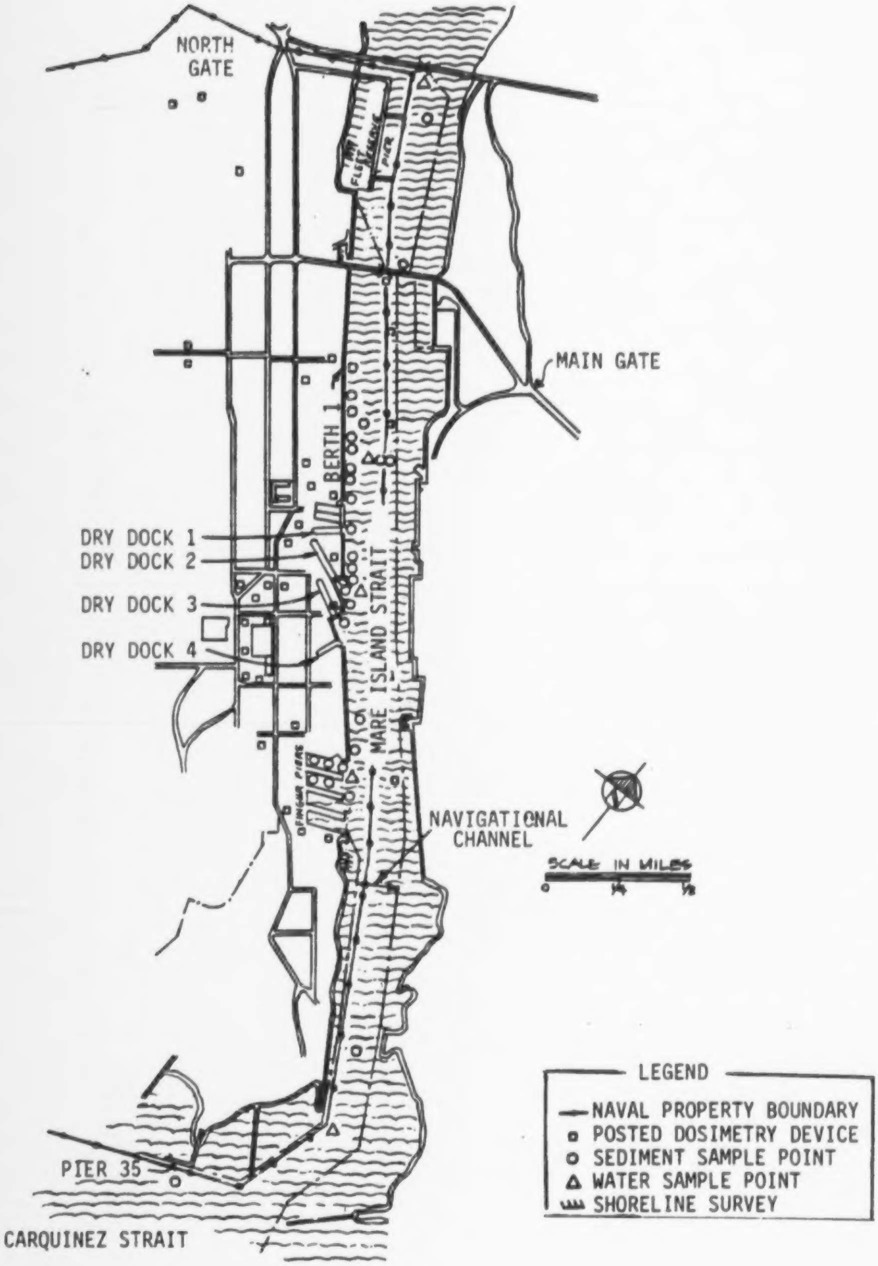
ENVIRONMENTAL MONITORING LOCATIONS AT THE HUNTERS POINT SHIPYARD SAN FRANCISCO, CALIFORNIA

FIGURE 2


DRY DOCK NO. 7
DRY DOCK NO. 6
DRY DOCK NO. 5
SAN FRANCISCO BAY
BERTH NO. 1
DRY DOCK 3
DRY DOCK
DRY DOCK NO. 4
BERTH 42
MAIN GATE
SOUTH GATE
LEGEND
NAVAL PROPERTY BOUNDARY
POSTED DOSIMETRY DEVICE
SEDIMENT SAMPLE POINT
WATER SAMPLE POINT
SHORELINE SURVEY
SCALE IN FEET
0 200 600 1000
100 400 800

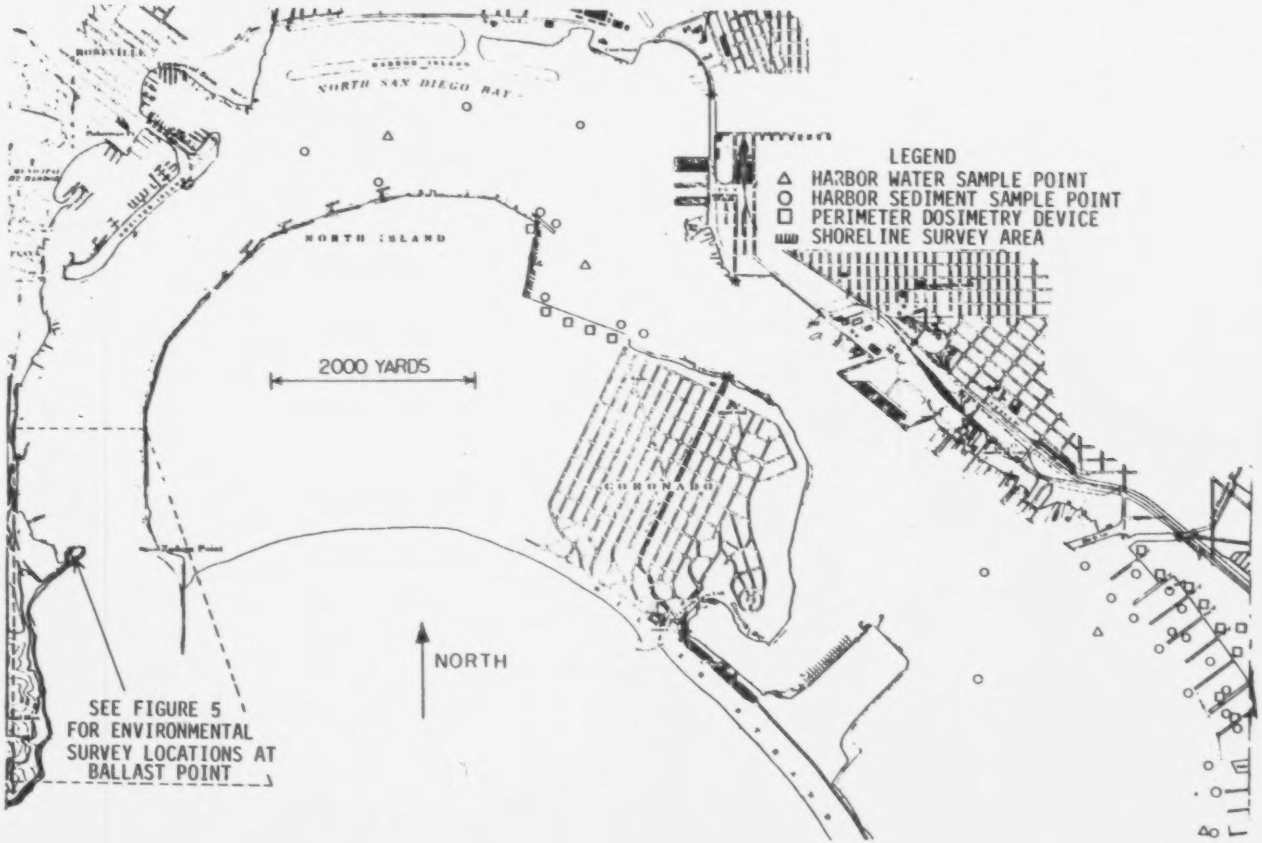
ENVIRONMENTAL MONITORING LOCATIONS AT THE
MARE ISLAND NAVAL SHIPYARD
VALLEJO, CALIFORNIA

FIGURE 3


NORTH GATE
MAIN GATE
BERTH 1
DRY DOCK 1
DRY DOCK 2
DRY DOCK 3
DRY DOCK 4
MARE ISLAND STRAIT
NAVIGATIONAL CHANNEL
PIER 35
CARQUINEZ STRAIT
SCALE IN MILES
0
1/4
1/2
LEGEND
NAVAL PROPERTY BOUNDARY
▫ POSTED DOSIMETRY DEVICE
○ SEDIMENT SAMPLE POINT
△ WATER SAMPLE POINT
SHORELINE SURVEY

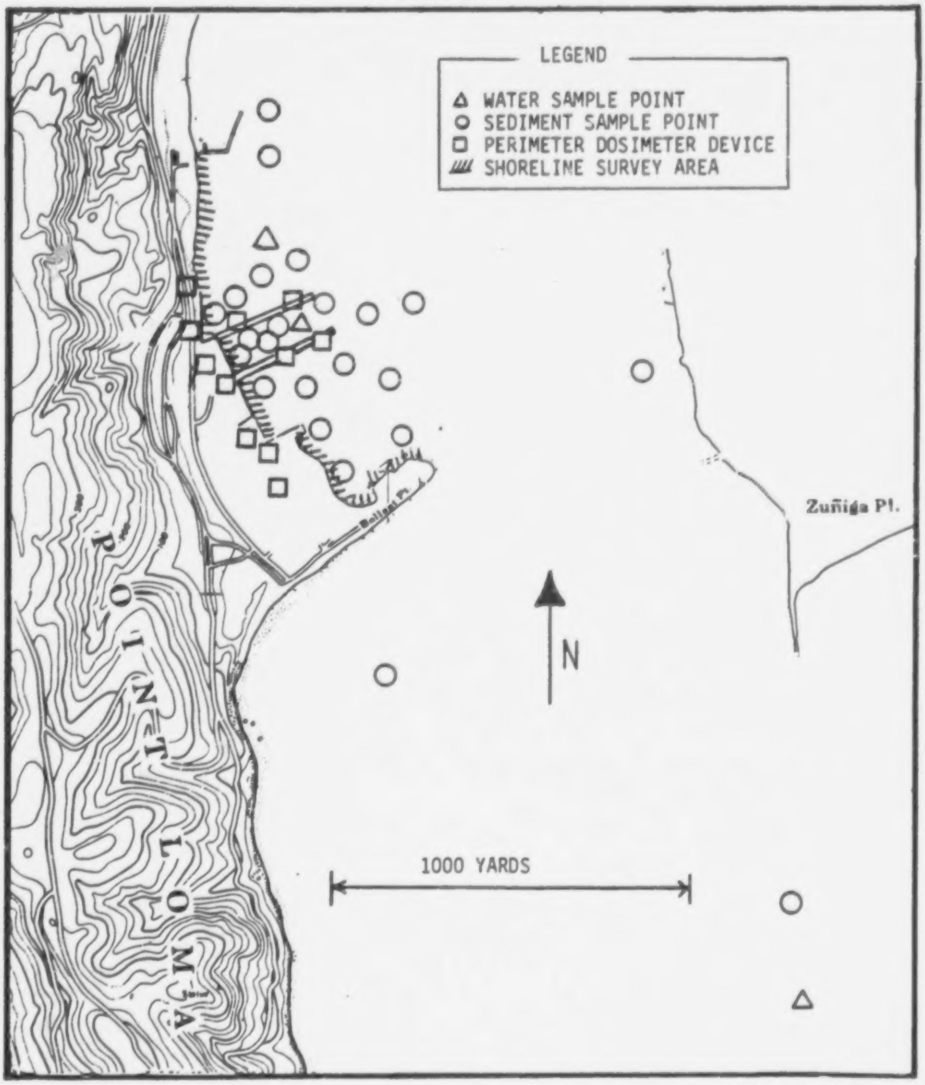
ENVIRONMENTAL MONITORING LOCATIONS AT SAN DIEGO BAY, CALIFORNIA

FIGURE 4

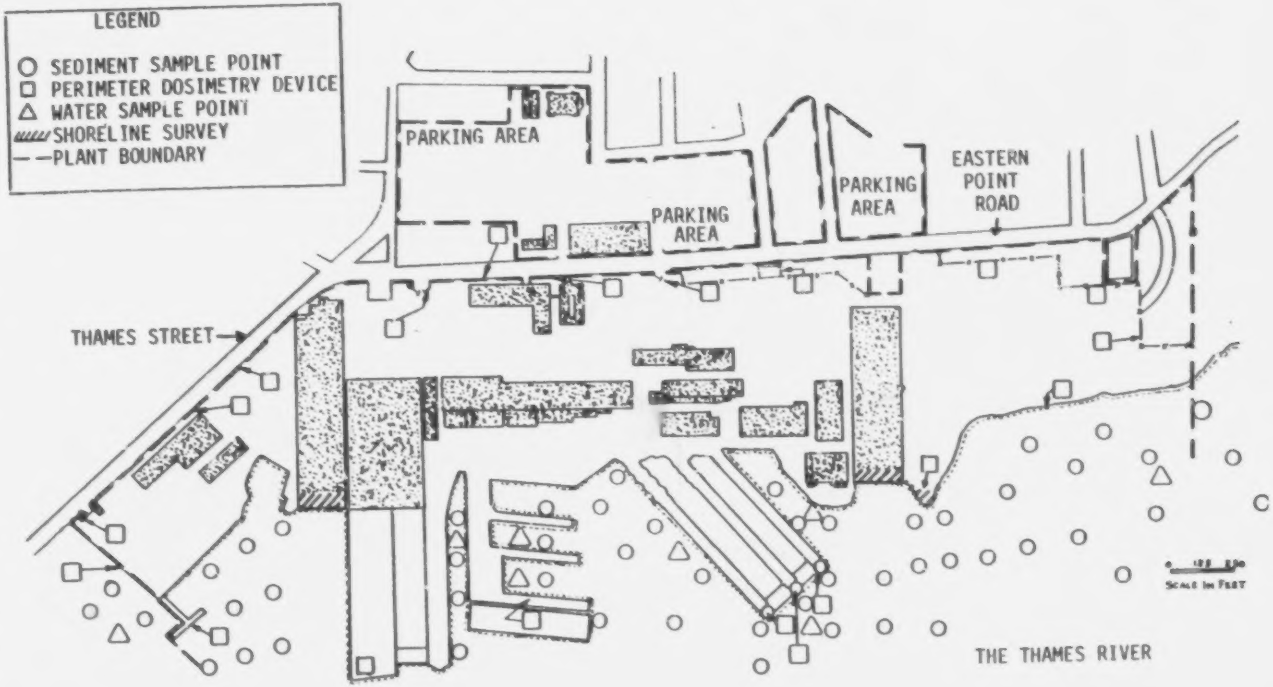

NORTH SAN DIEGO BAY
HARBOR ISLAND
NORTH ISLAND
CORONADO
LEGEND
△ HARBOR WATER SAMPLE POINT
○ HARBOR SEDIMENT SAMPLE POINT
□ PERIMETER DOSIMETRY DEVICE
▥ SHORELINE SURVEY AREA
2000 YARDS
NORTH
SEE FIGURE 5 FOR ENVIRONMENTAL SURVEY LOCATIONS AT BALLAST POINT

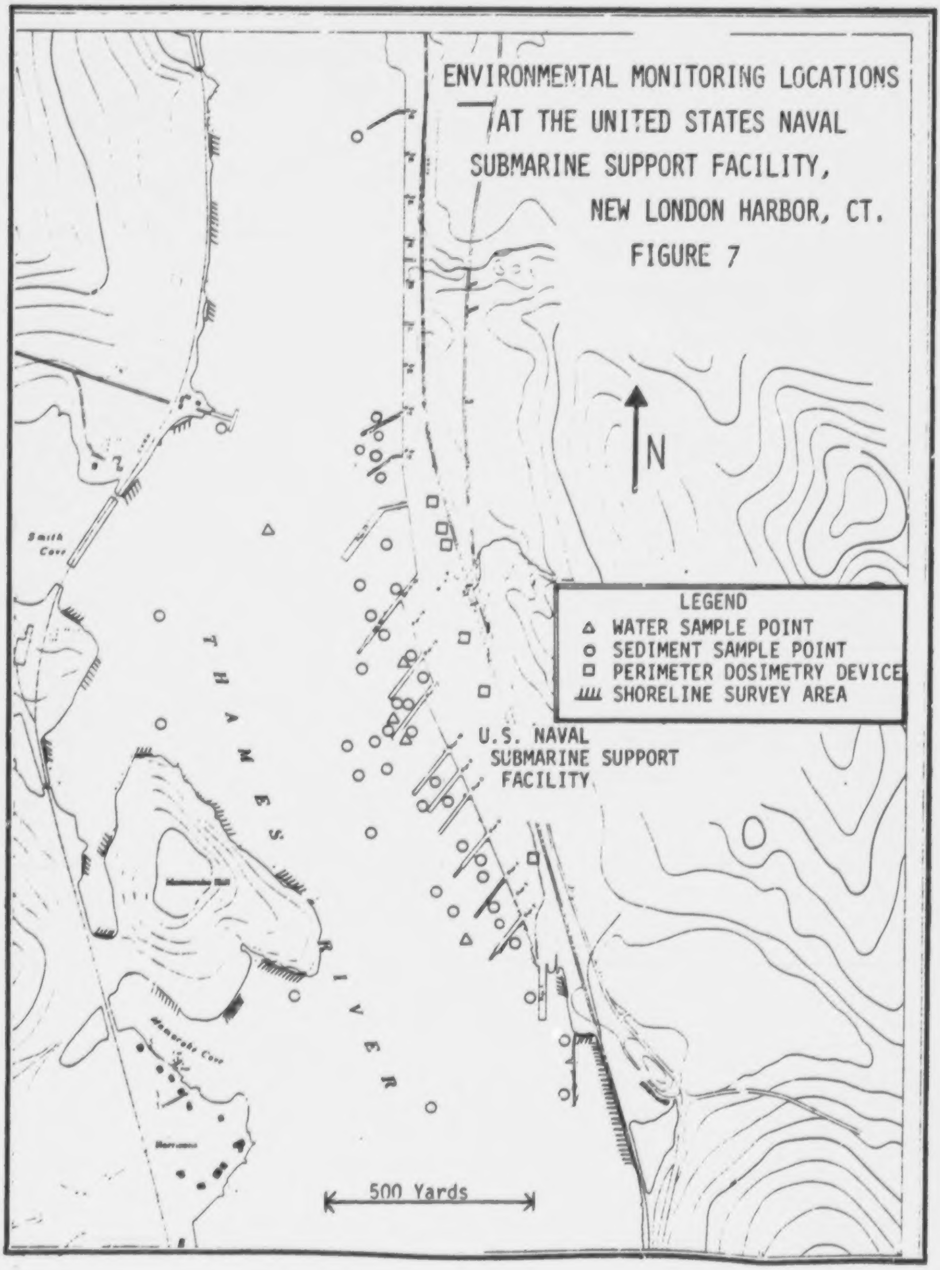
ENVIRONMENTAL MONITORING LOCATIONS AT
BALLAST POINT, SAN DIEGO HARBOR

FIGURE 5


LEGEND
△ WATER SAMPLE POINT
○ SEDIMENT SAMPLE POINT
□ PERIMETER DOSIMETER DEVICE
/// SHORELINE SURVEY AREA
Zuñiga Pt.
Ballast Pt.
POINT LOMA
N
1000 YARDS

ENVIRONMENTAL MONITORING LOCATIONS
AT GENERAL DYNAMICS/ELECTRIC BOAT
GROTON, CT.
FIGURE 6


LEGEND
○ SEDIMENT SAMPLE POINT
□ PERIMETER DOSIMETRY DEVICE
△ WATER SAMPLE POINT
SHORELINE SURVEY
– –PLANT BOUNDARY
PARKING AREA
PARKING AREA
PARKING AREA
EASTERN POINT ROAD
THAMES STREET
THE THAMES RIVER
0 125 250
SCALE IN FEET



ENVIRONMENTAL MONITORING LOCATIONS AT THE UNITED STATES NAVAL SUBMARINE SUPPORT FACILITY, NEW LONDON HARBOR, CT.

FIGURE 7

N
LEGEND
△ WATER SAMPLE POINT
○ SEDIMENT SAMPLE POINT
□ PERIMETER DOSIMETRY DEVICE
ﾛﾛﾛ SHORELINE SURVEY AREA
U.S. NAVAL SUBMARINE SUPPORT FACILITY
THAMES RIVER
Smith Cove
500 Yards

ENVIRONMENTAL MONITORING LOCATIONS
AT STATE PIER AREA, NEW LONDON, CT
FIGURE 8

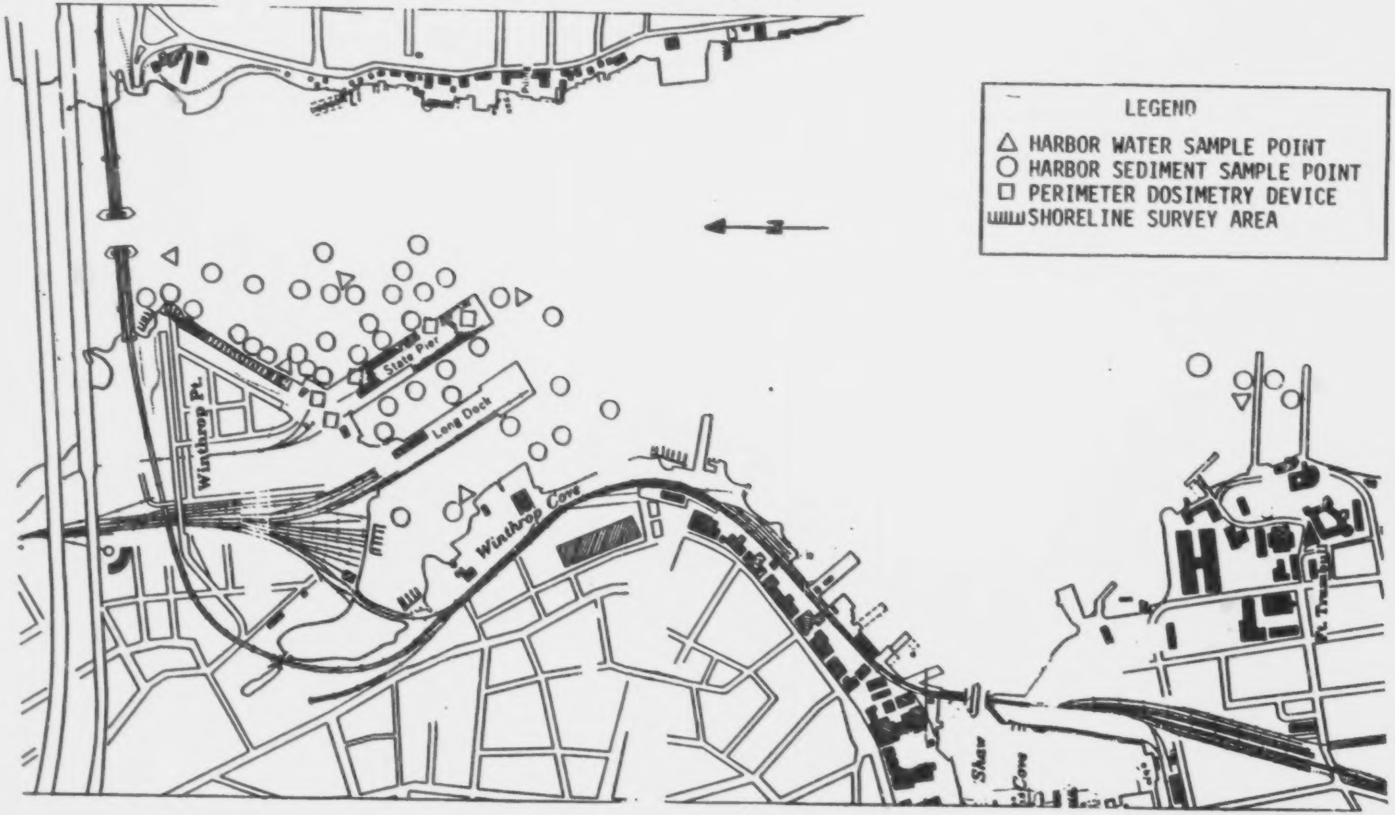
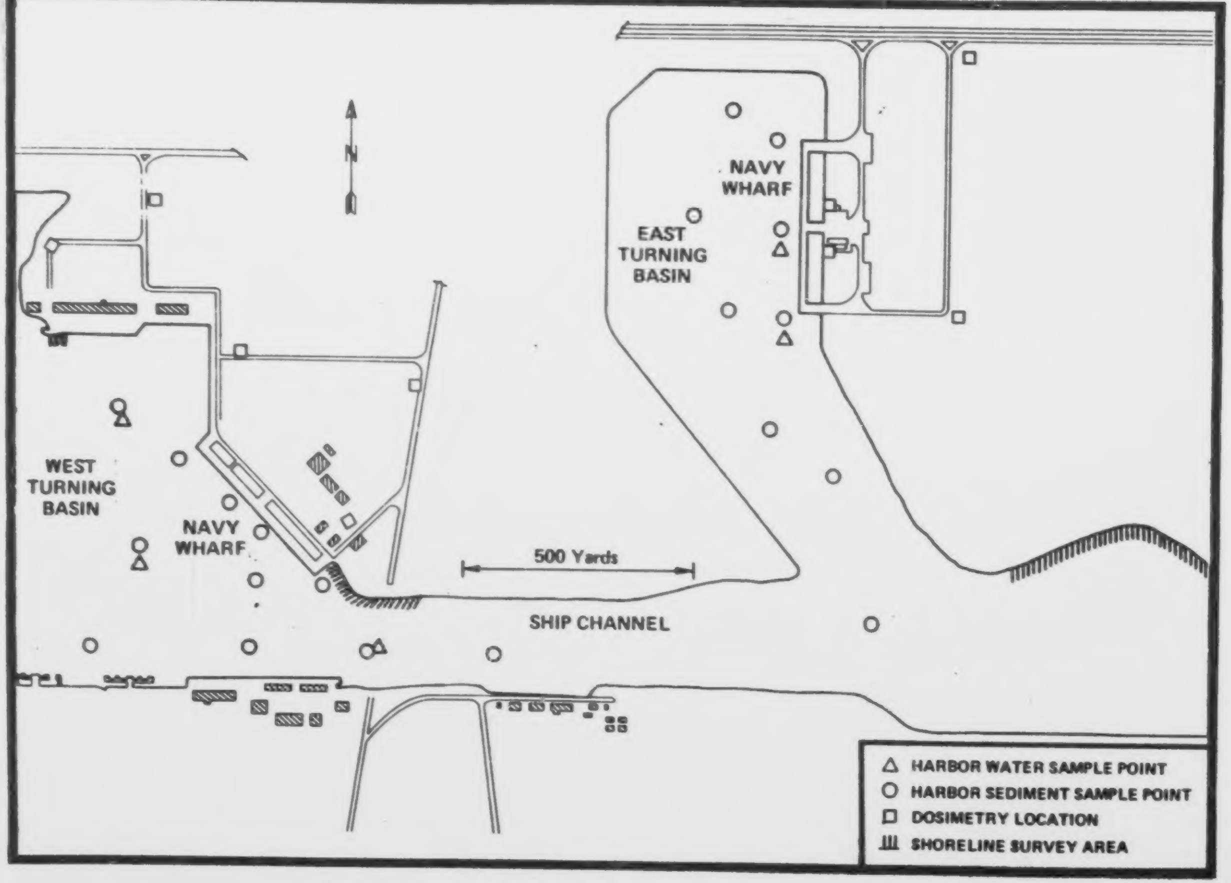
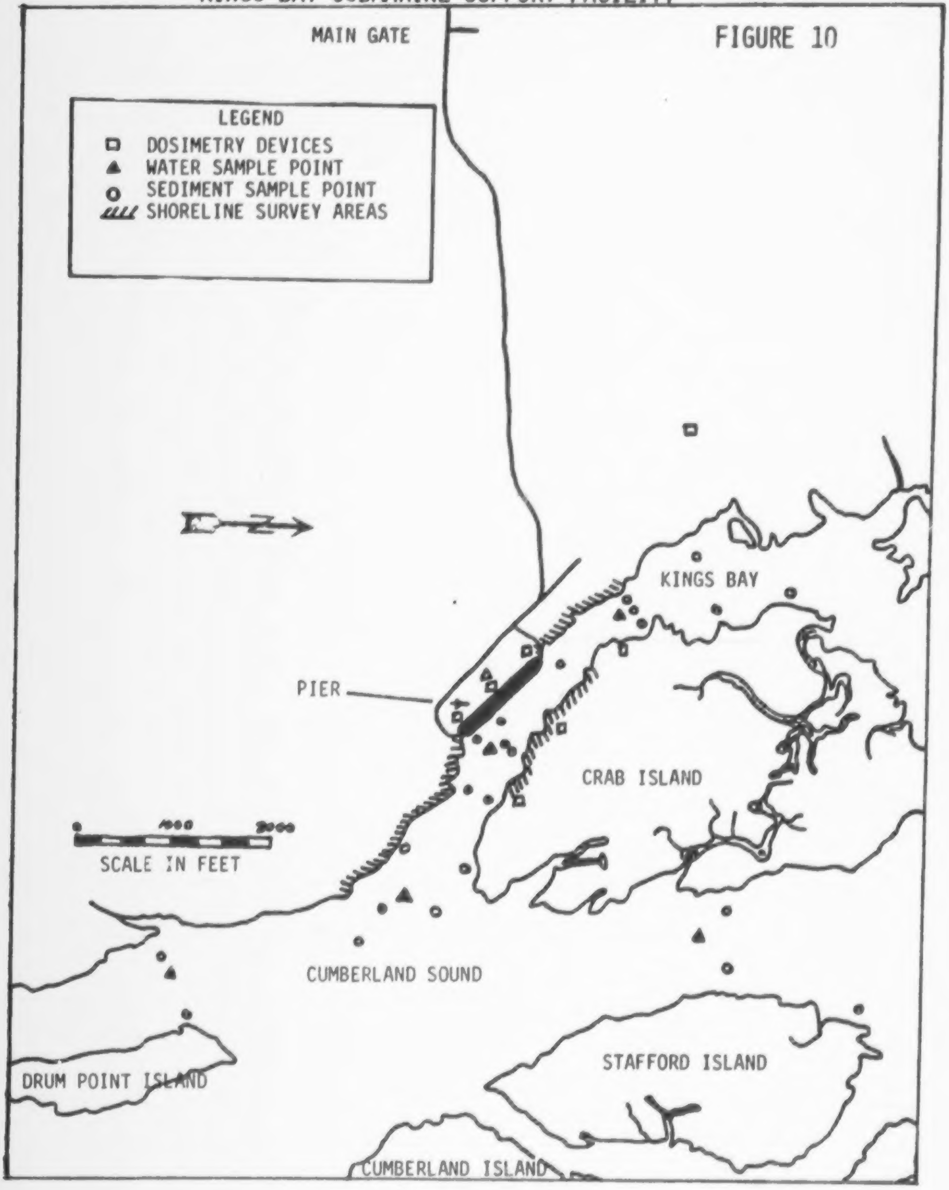

LEGEND
△ HARBOR WATER SAMPLE POINT
○ HARBOR SEDIMENT SAMPLE POINT
□ PERIMETER DOSIMETRY DEVICE
ШШ SHORELINE SURVEY AREA
N
State Pier
Long Dock
Winthrop Pt.
Winthrop Cove
Shaw Cove

FIGURE 9. ENVIRONMENTAL MONITORING LOCATIONS AT PORT CANAVERAL, FLORIDA


N
NAVY
WHARF
EAST
TURNING
BASIN
WEST
TURNING
BASIN
NAVY
WHARF
500 Yards
SHIP CHANNEL
△ HARBOR WATER SAMPLE POINT
○ HARBOR SEDIMENT SAMPLE POINT
□ DOSIMETRY LOCATION
Ш SHORELINE SURVEY AREA

ENVIRONMENTAL MONITORING LOCATIONS AT KINGS BAY SUBMARINE SUPPORT FACILITY

FIGURE 10


MAIN GATE
LEGEND
□ DOSIMETRY DEVICES
▲ WATER SAMPLE POINT
○ SEDIMENT SAMPLE POINT
SHORELINE SURVEY AREAS
N
KINGS BAY
PIER
CRAB ISLAND
0
1000
2000
SCALE IN FEET
CUMBERLAND SOUND
DRUM POINT ISLAND
STAFFORD ISLAND
CUMBERLAND ISLAND

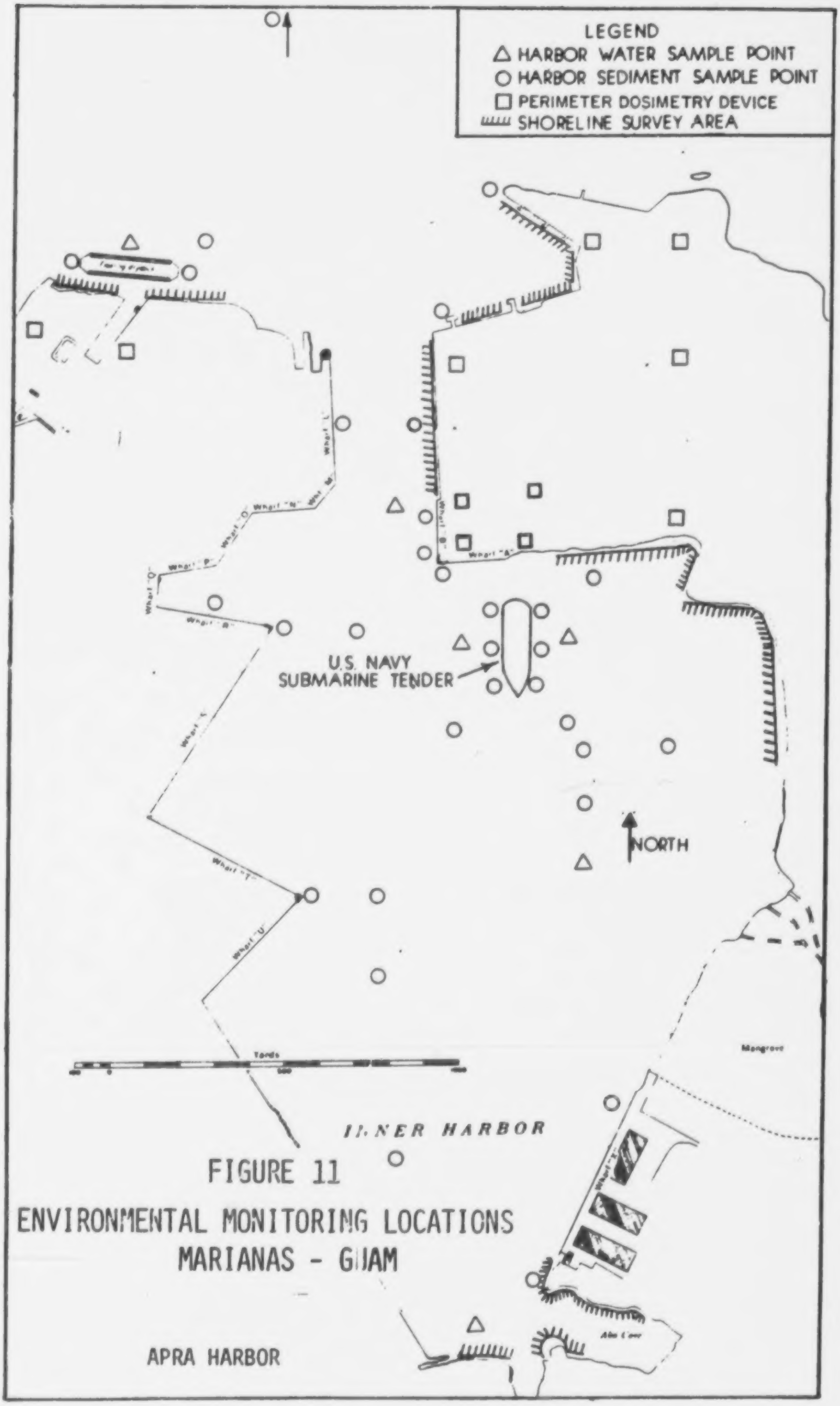
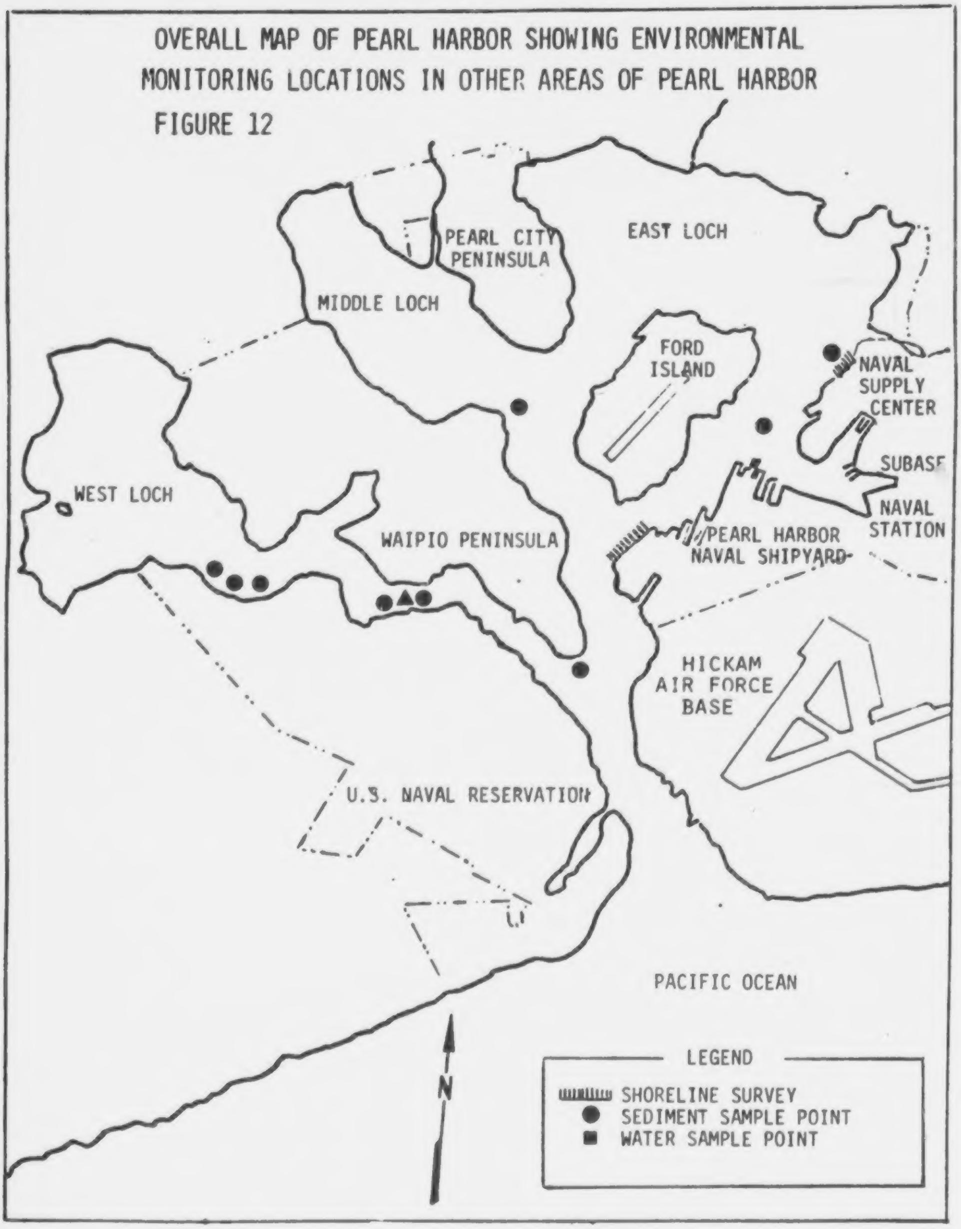

LEGEND
△ HARBOR WATER SAMPLE POINT
○ HARBOR SEDIMENT SAMPLE POINT
☐ PERIMETER DOSIMETRY DEVICE
SHORELINE SURVEY AREA
U.S. NAVY SUBMARINE TENDER
NORTH
Wharf "A"
Wharf "B"
Wharf "O"
Wharf "P"
Wharf "R"
Wharf "T"
Wharf "U"
Yards
Mangrove
INNER HARBOR
APRA HARBOR

FIGURE 11

ENVIRONMENTAL MONITORING LOCATIONS MARIANAS - GUAM



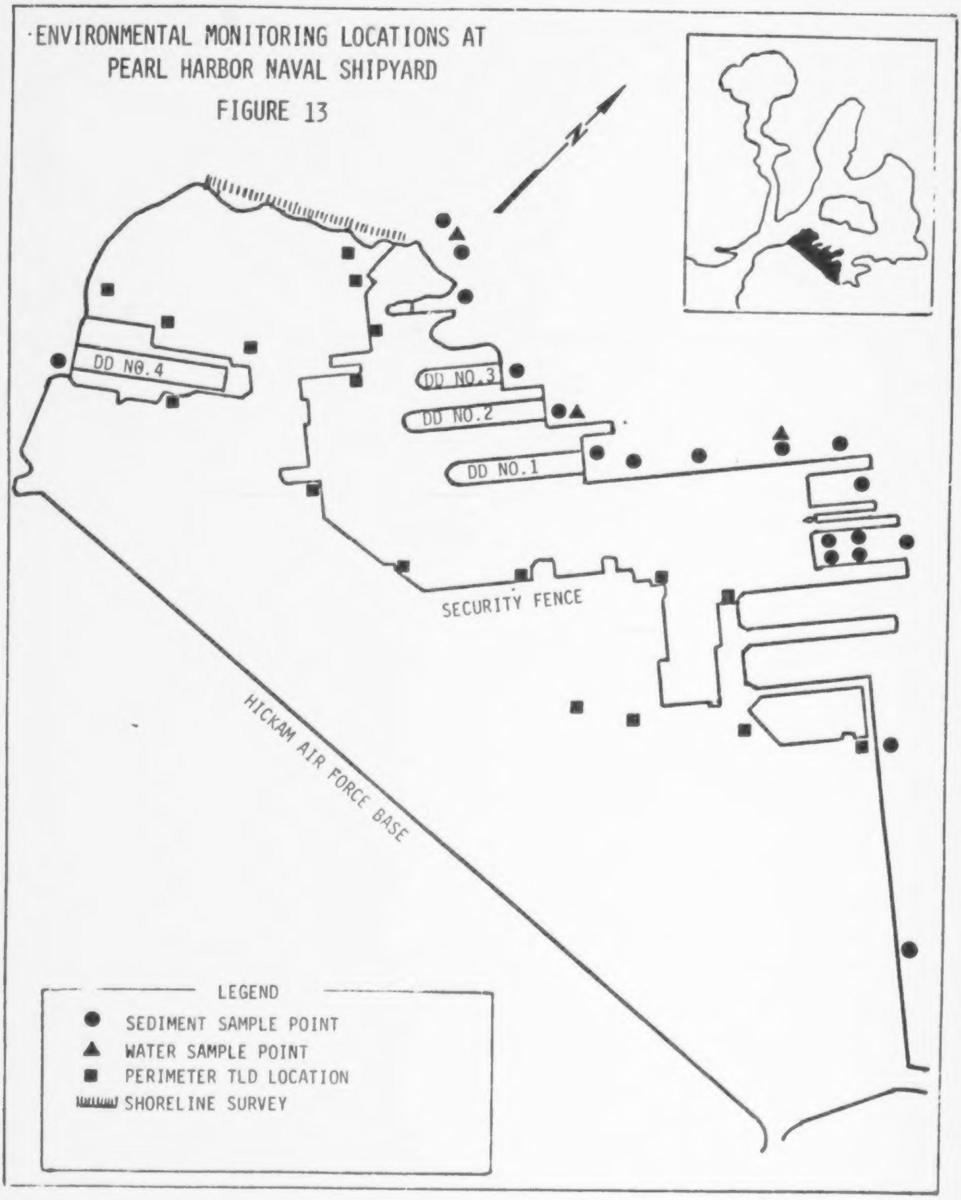
OVERALL MAP OF PEARL HARBOR SHOWING ENVIRONMENTAL MONITORING LOCATIONS IN OTHER AREAS OF PEARL HARBOR

FIGURE 12

PEARL CITY
PENINSULA
EAST LOCH
MIDDLE LOCH
FORD
ISLAND
NAVAL
SUPPLY
CENTER
SUBASE
NAVAL
STATION
WEST LOCH
WAIPIO PENINSULA
PEARL HARBOR
NAVAL SHIPYARD
HICKAM
AIR FORCE
BASE
U.S. NAVAL RESERVATION
PACIFIC OCEAN
N
LEGEND
SHORELINE SURVEY
● SEDIMENT SAMPLE POINT
■ WATER SAMPLE POINT

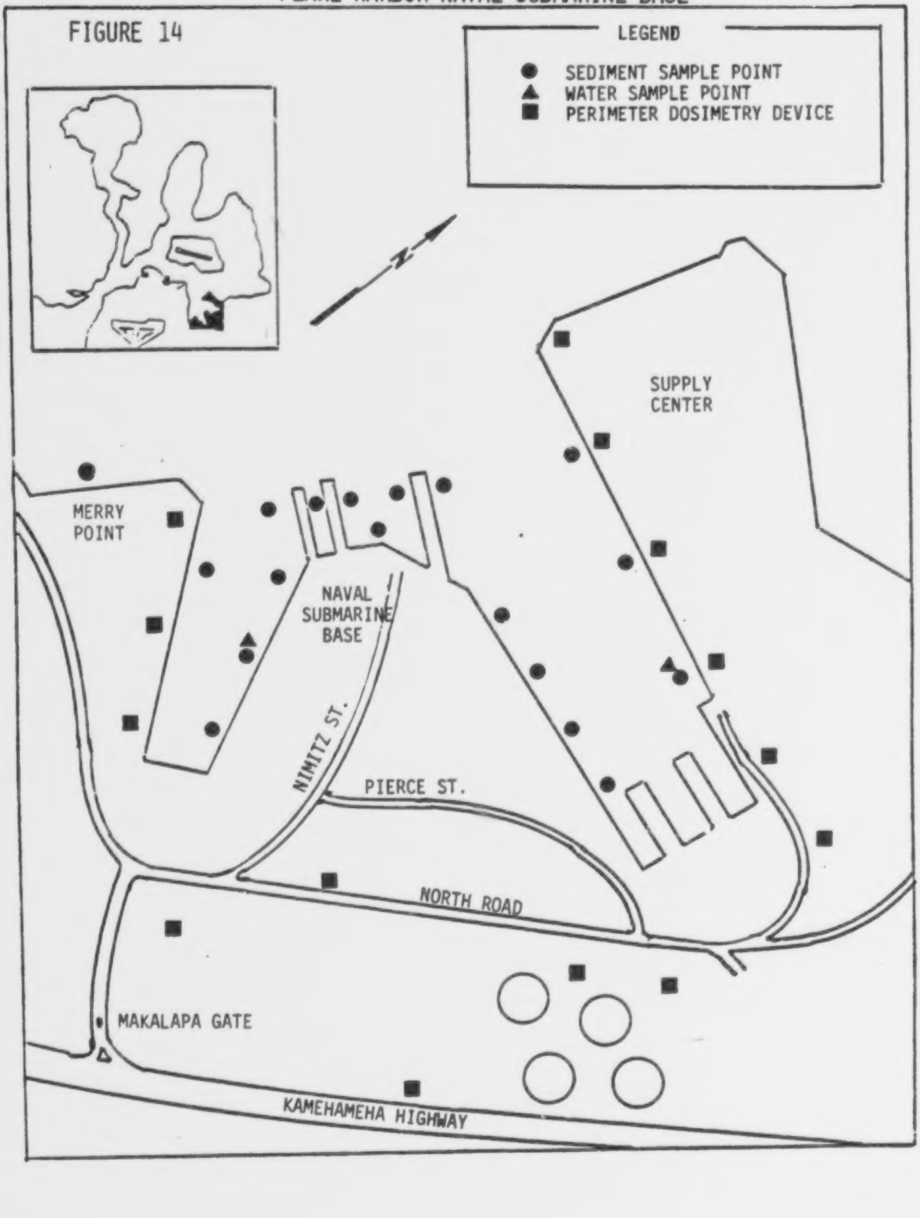
ENVIRONMENTAL MONITORING LOCATIONS AT PEARL HARBOR NAVAL SHIPYARD

FIGURE 13


N
DD NO.4
DD NO.3
DD NO.2
DD NO.1
SECURITY FENCE
HICKAM AIR FORCE BASE
LEGEND
● SEDIMENT SAMPLE POINT
▲ WATER SAMPLE POINT
■ PERIMETER TLD LOCATION
SHORELINE SURVEY

ENVIRONMENTAL MONITORING LOCATIONS AT
PEARL HARBOR NAVAL SUBMARINE BASE

FIGURE 14


LEGEND
● SEDIMENT SAMPLE POINT
▲ WATER SAMPLE POINT
■ PERIMETER DOSIMETRY DEVICE
N
SUPPLY CENTER
MERRY POINT
NAVAL SUBMARINE BASE
NIMITZ ST.
PIERCE ST.
NORTH ROAD
MAKALAPA GATE
KAMEHAMEHA HIGHWAY

ENVIRONMENTAL MONITORING LOCATIONS
AT PORTSMOUTH NAVAL SHIPYARD
PORTSMOUTH-KITTERY HARBOR

FIGURE 15

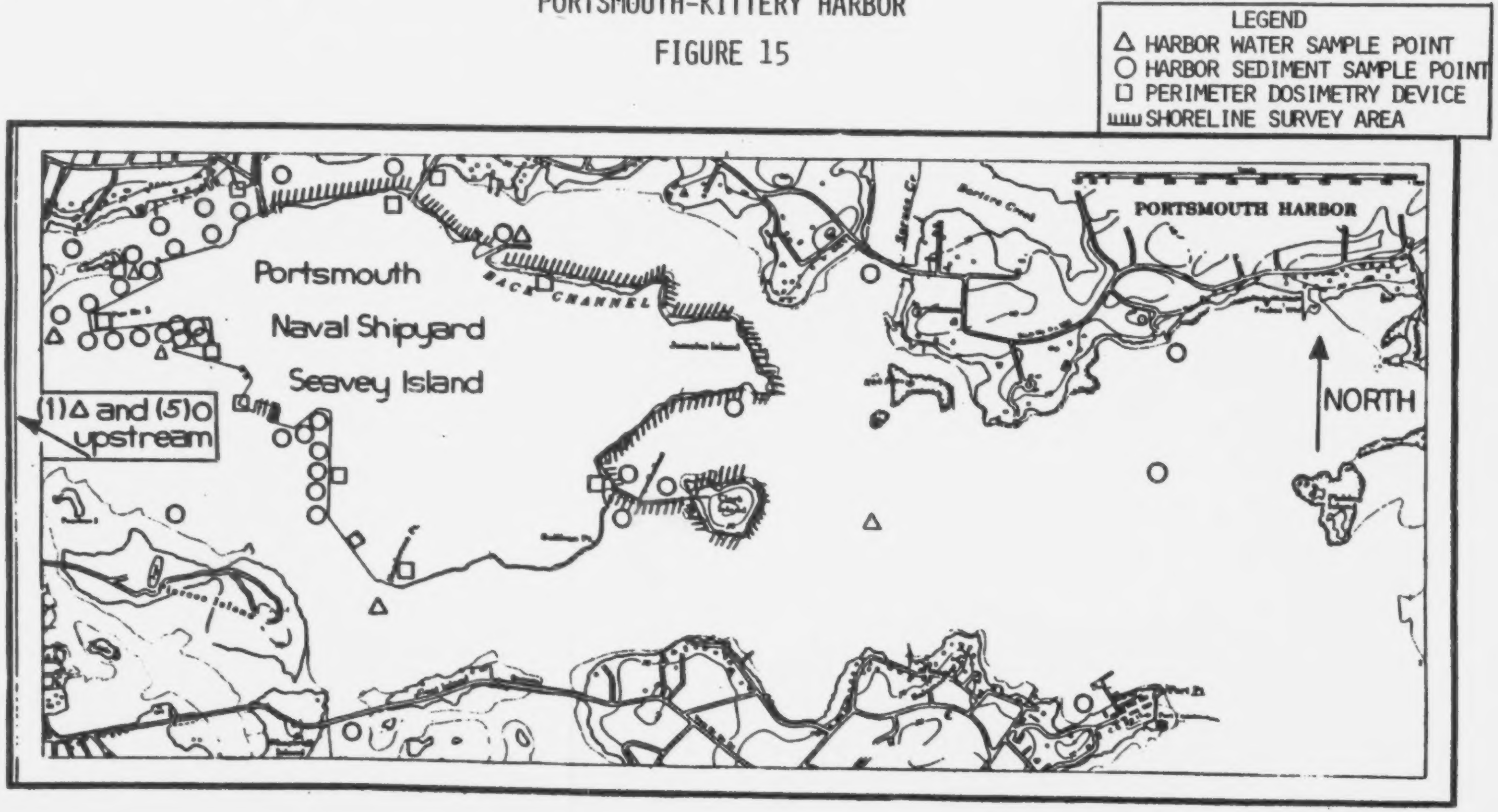

LEGEND
△ HARBOR WATER SAMPLE POINT
○ HARBOR SEDIMENT SAMPLE POINT
□ PERIMETER DOSIMETRY DEVICE
ШШ SHORELINE SURVEY AREA
PORTSMOUTH HARBOR
NORTH
Portsmouth
Naval Shipyard
Seavey Island
BACK CHANNEL
(1)△ and (5)○
upstream

FIGURE 16. U.S. NAVAL STATION & NAVAL SHIPYARD, CHARLESTON, SC.

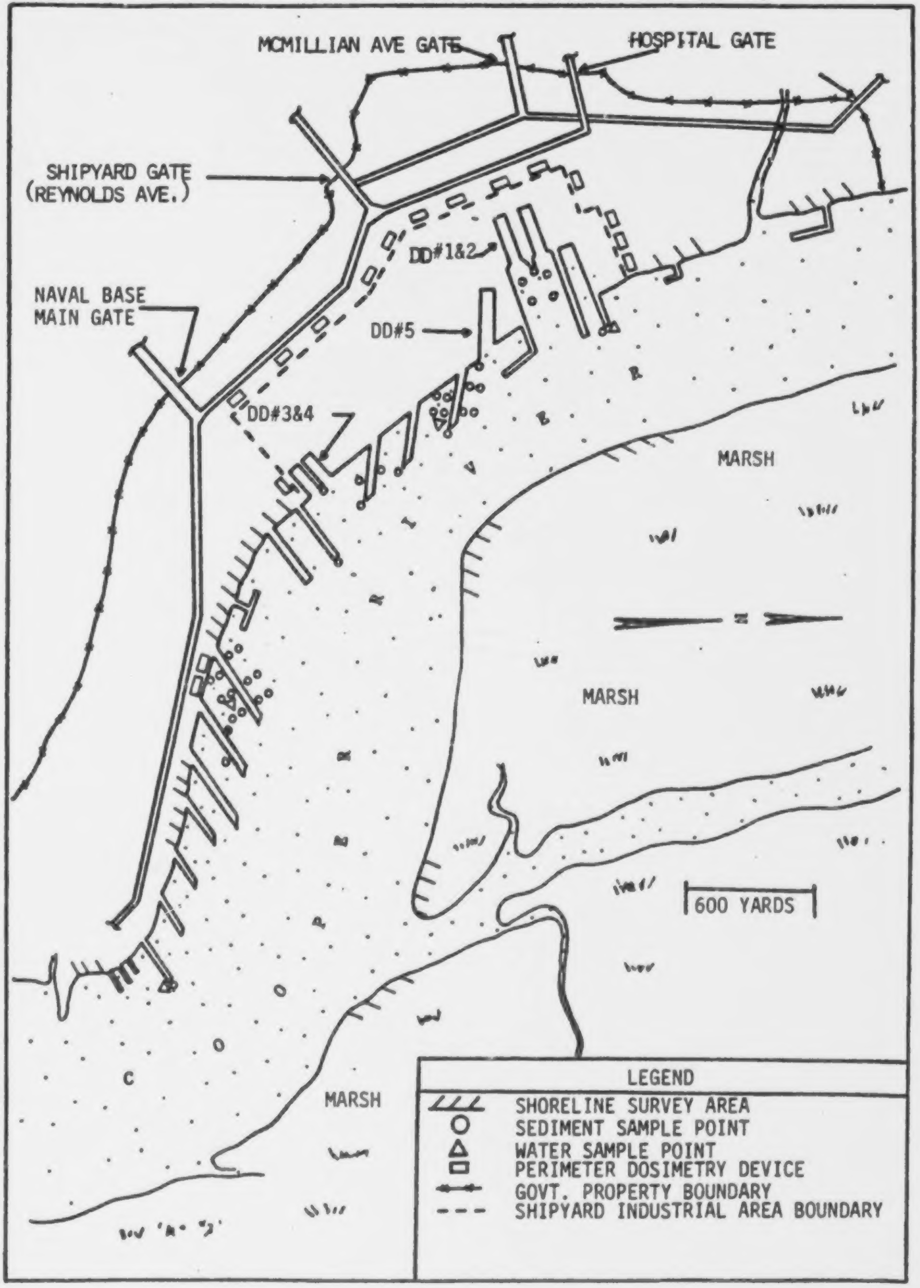
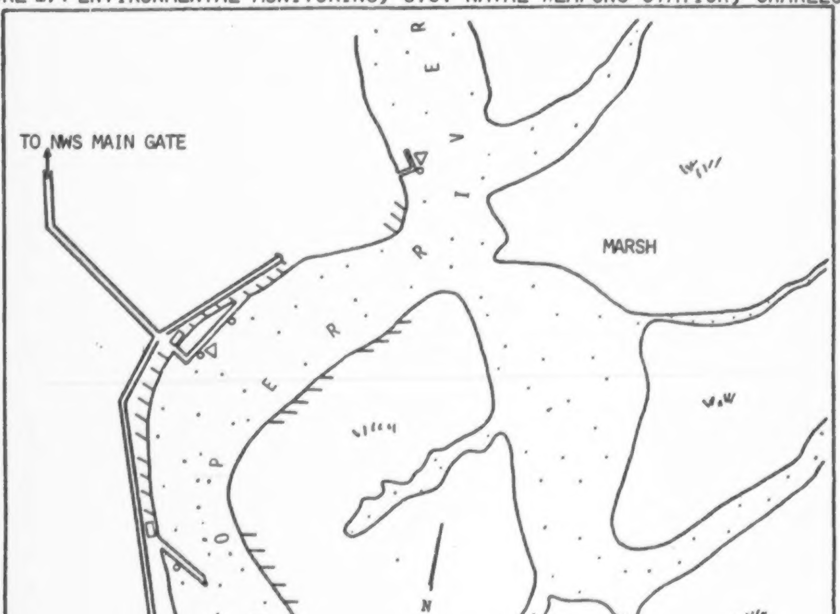
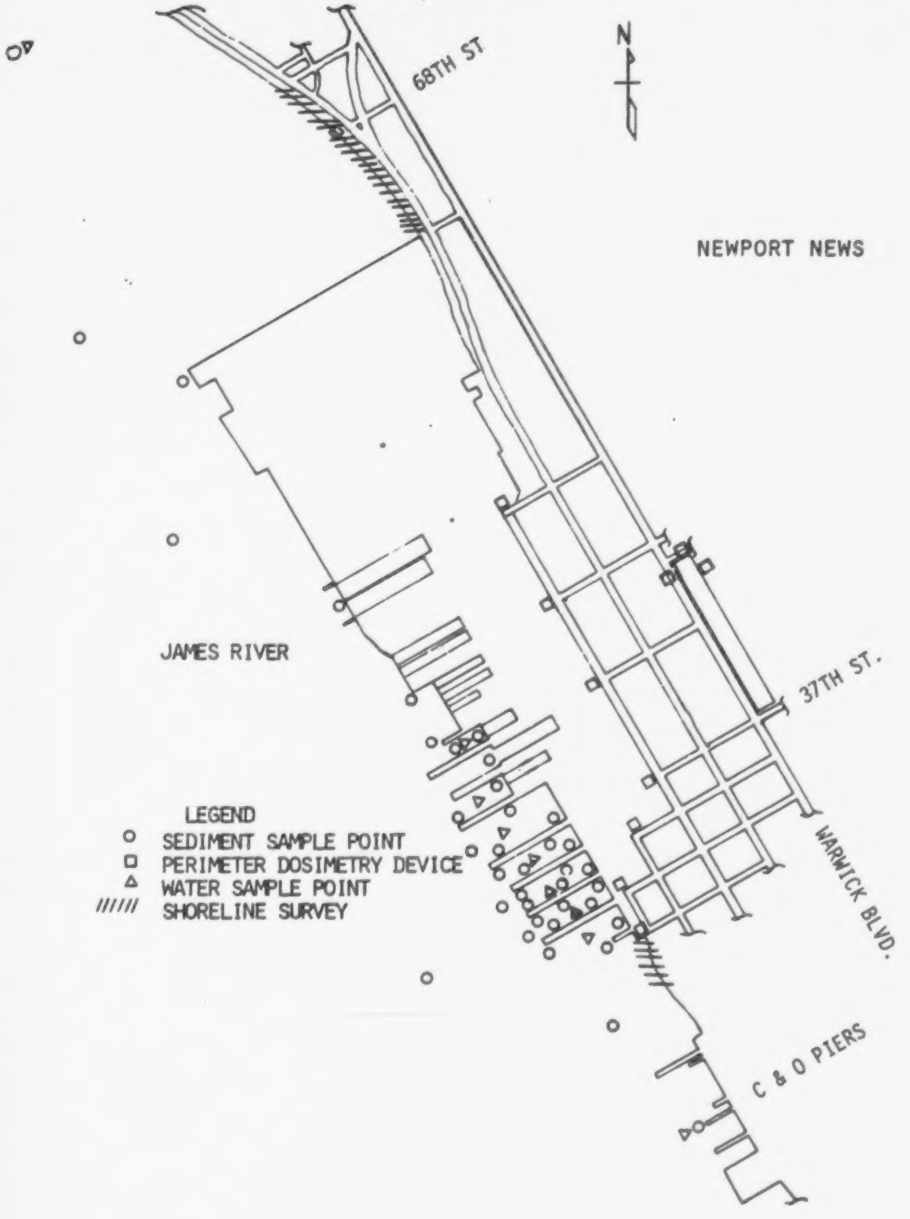

MCMILLIAN AVE GATE
HOSPITAL GATE
SHIPYARD GATE (REYNOLDS AVE.)
NAVAL BASE MAIN GATE
DD#1&2
DD#5
DD#3&4
COOPER RIVER
MARSH
MARSH
MARSH
600 YARDS
LEGEND
SHORELINE SURVEY AREA
○ SEDIMENT SAMPLE POINT
△ WATER SAMPLE POINT
□ PERIMETER DOSIMETRY DEVICE
GOVT. PROPERTY BOUNDARY
SHIPYARD INDUSTRIAL AREA BOUNDARY

FIGURE 17. ENVIRONMENTAL MONITORING, U.S. NAVAL WEAPONS STATION, CHARLESTON


TO NWS MAIN GATE
COOPER RIVER
MARSH
N
MARSH
600 YARDS
FLOATING DRY DOCK
LEGEND
SHORELINE SURVEY AREA
SEDIMENT SAMPLE POINT
WATER SAMPLE POINT
PERIMETER DOSIMETRY DEVICE

ENVIRONMENTAL MONITORING LOCATIONS
AT NEWPORT NEWS SHIPBUILDING AND DRY DOCK COMPANY
FIGURE 18



N
68TH ST
NEWPORT NEWS
JAMES RIVER
37TH ST.
WARWICK BLVD.
C & O PIERS
LEGEND
○ SEDIMENT SAMPLE POINT
☐ PERIMETER DOSIMETRY DEVICE
△ WATER SAMPLE POINT
////// SHORELINE SURVEY

FIGURE 19. ENVIRONMENTAL MONITORING LOCATIONS AT NORFOLK NAVAL SHIPYARD, PORTSMOUTH, VA

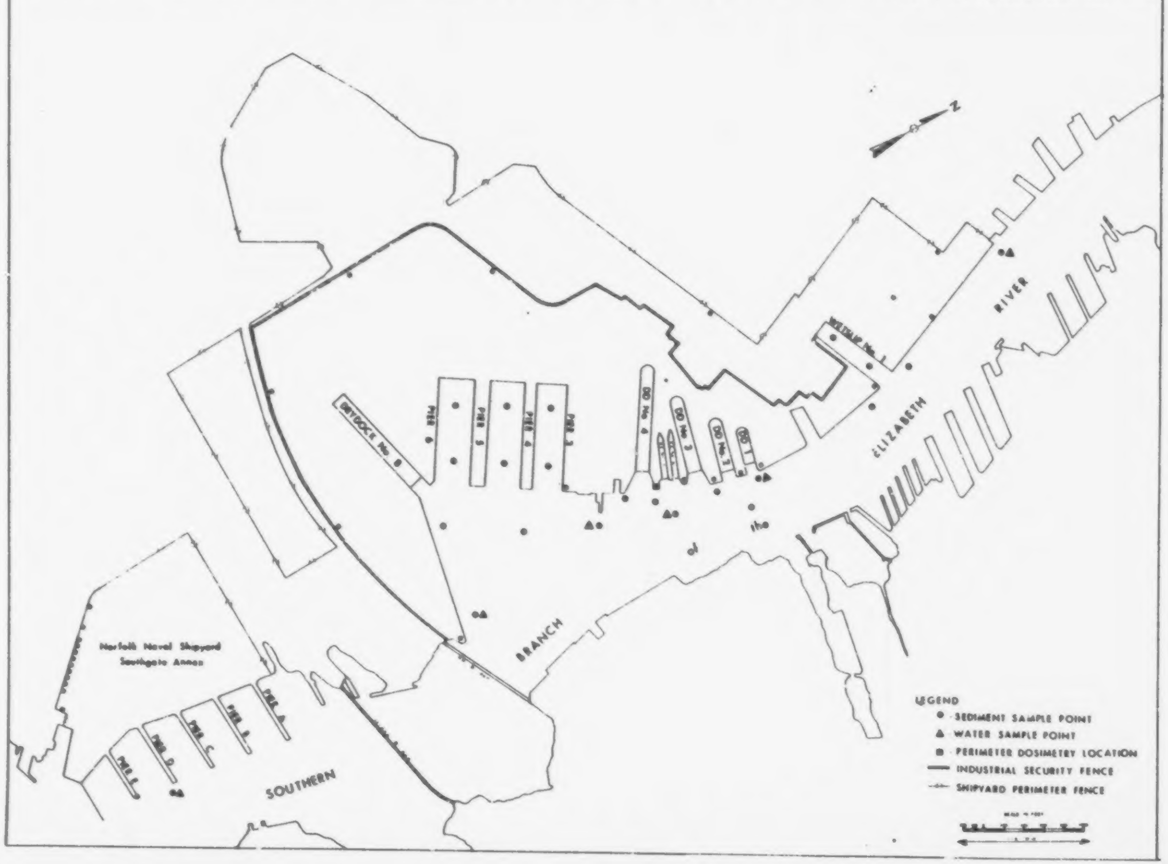

N
ELIZABETH
RIVER
of the
SOUTHERN
BRANCH
WETSLIP No. 1
DD 1
DD No. 2
DD No 3
DD No 4
PIER 3
PIER 4
PIER 5
PIER 6
DRYDOCK No 8
PIER A
PIER B
PIER C
PIER D
PIER E
Norfolk Naval Shipyard
Southgate Annex
LEGEND
● SEDIMENT SAMPLE POINT
▲ WATER SAMPLE POINT
■ PERIMETER DOSIMETRY LOCATION
INDUSTRIAL SECURITY FENCE
SHIPYARD PERIMETER FENCE

FIGURE 20: ENVIRONMENTAL MONITORING LOCATIONS AT NORFOLK NAVAL STATION

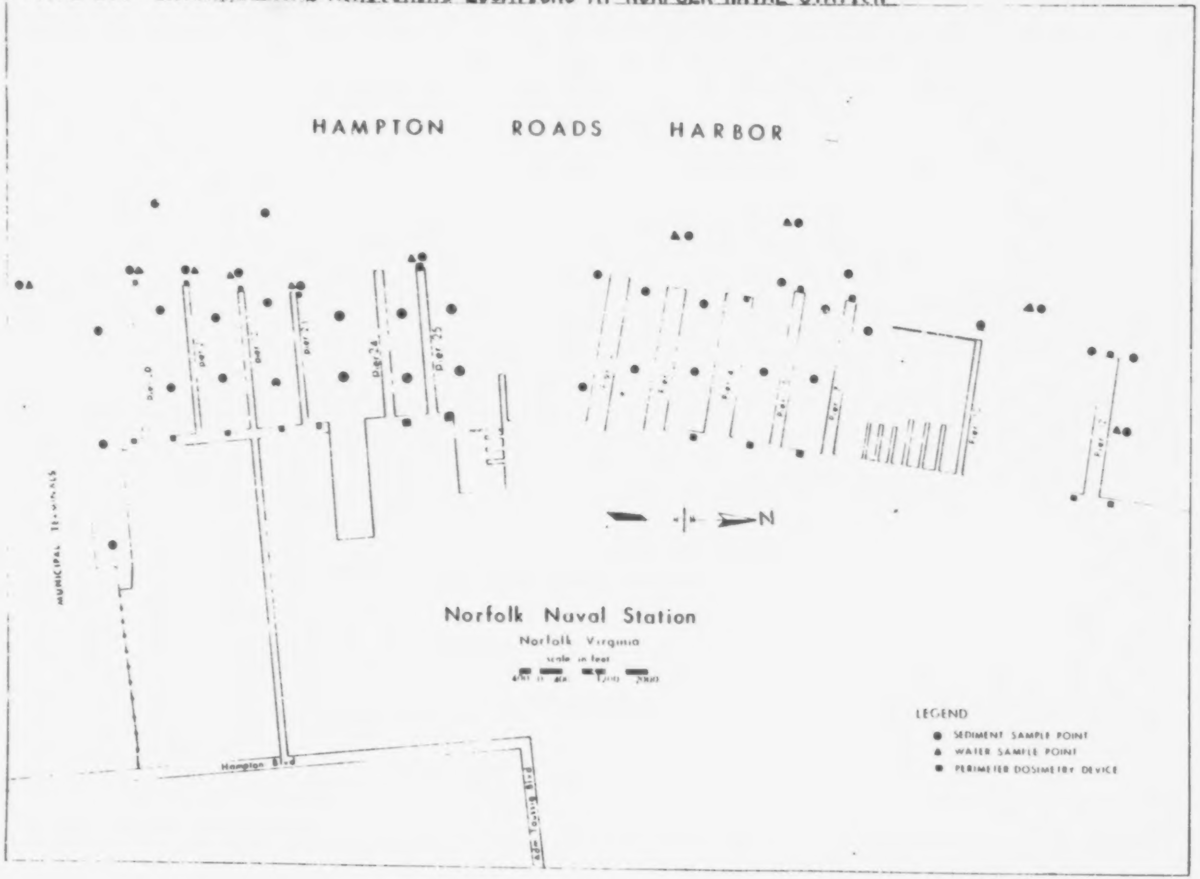

HAMPTON ROADS HARBOR
Pier 24
Pier 25
N
Norfolk Naval Station
Norfolk Virginia
scale in feet
MUNICIPAL TERMINALS
Hampton Blvd
LEGEND
● SEDIMENT SAMPLE POINT
▲ WATER SAMPLE POINT
■ PERIMETER DOSIMETRY DEVICE

FIGURE 21

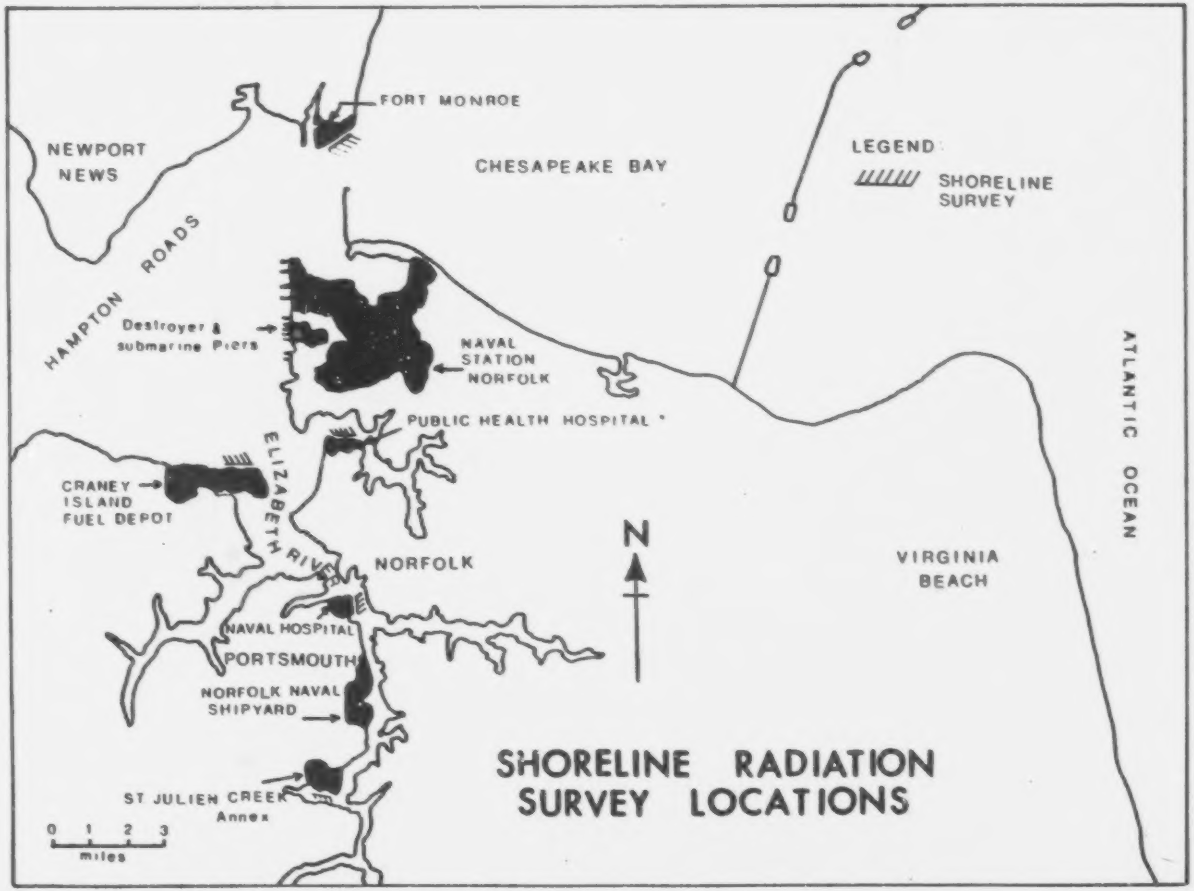
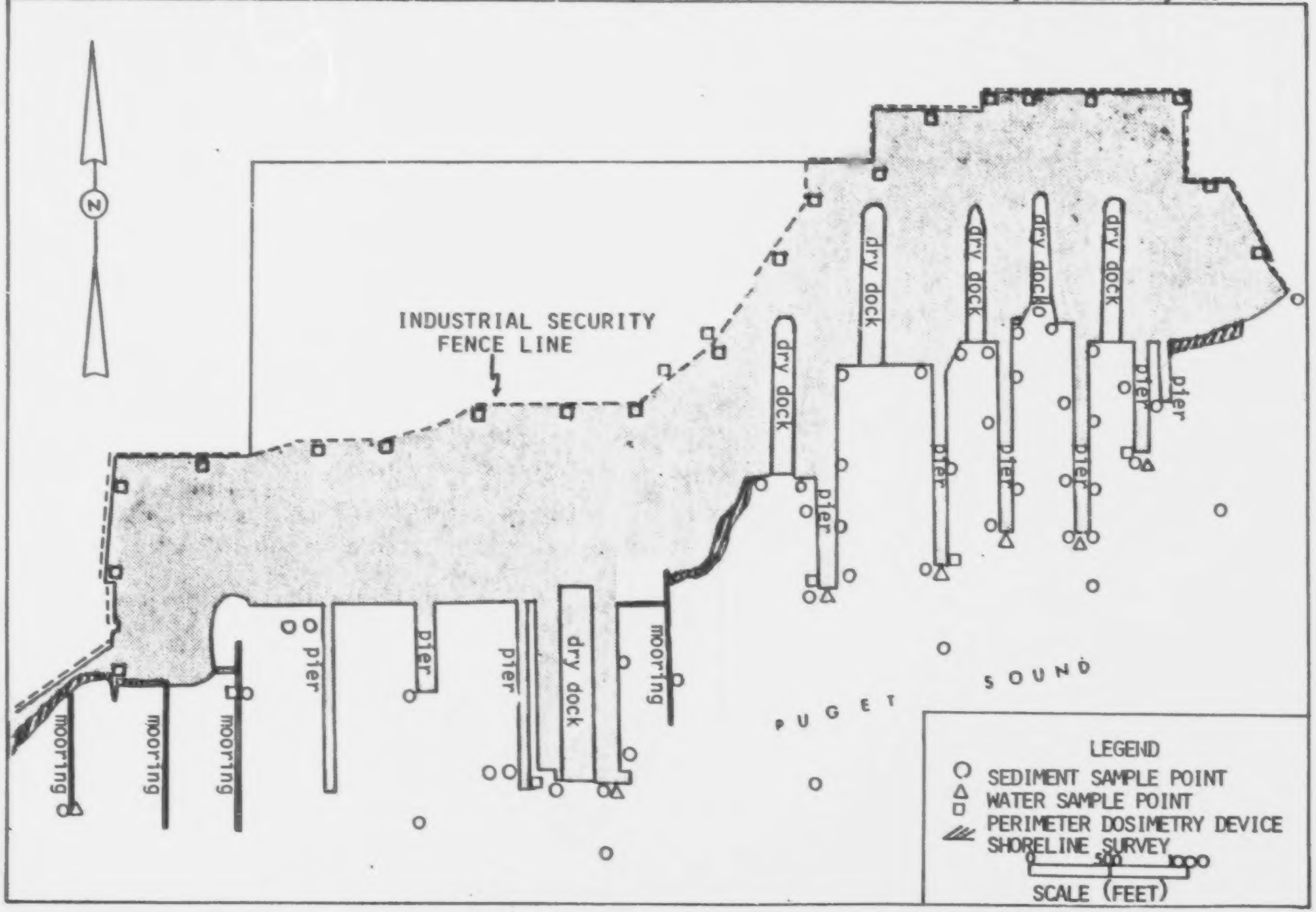
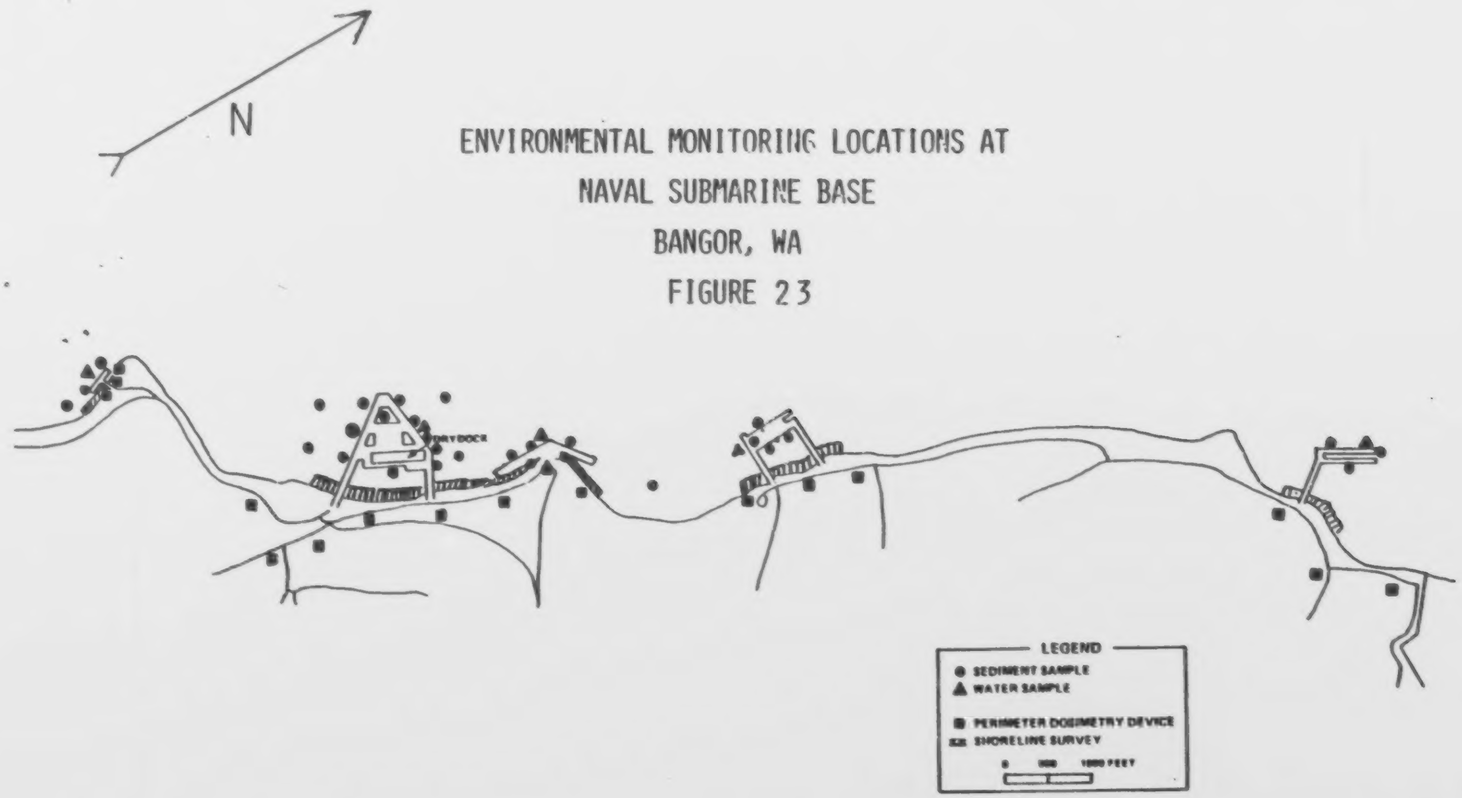

FORT MONROE
NEWPORT NEWS
CHESAPEAKE BAY
LEGEND:
SHORELINE SURVEY
HAMPTON ROADS
Destroyer & submarine Piers
NAVAL STATION NORFOLK
PUBLIC HEALTH HOSPITAL
ATLANTIC OCEAN
CRANEY ISLAND FUEL DEPOT
ELIZABETH RIVER
NORFOLK
N
VIRGINIA BEACH
NAVAL HOSPITAL
PORTSMOUTH
NORFOLK NAVAL SHIPYARD
ST JULIEN CREEK Annex
0 1 2 3
miles
SHORELINE RADIATION SURVEY LOCATIONS

FIGURE 22. ENVIRONMENTAL MONITORING LOCATIONS, PUGET SOUND NAVAL SHIPYARD, BREMERTON, WA


Z
INDUSTRIAL SECURITY FENCE LINE
dry dock
dry dock
dry dock
dry dock
dry dock
dry dock
pier
pier
pier
pier
pier
pier
pier
pier
pier
pier
mooring
mooring
mooring
mooring
PUGET SOUND
LEGEND
SEDIMENT SAMPLE POINT
WATER SAMPLE POINT
PERIMETER DOSIMETRY DEVICE
SHORELINE SURVEY
0
500
1000
SCALE (FEET)


HOOD CANAL
N
DRYDOCK
LEGEND
● SEDIMENT SAMPLE
▲ WATER SAMPLE
■ PERIMETER DOSIMETRY DEVICE
▨ SHORELINE SURVEY
0
1000 FEET

ENVIRONMENTAL MONITORING LOCATIONS AT
NAVAL SUBMARINE BASE
BANGOR, WA
FIGURE 23

Report NT-84-2
February 1984

OCCUPATIONAL RADIATION EXPOSURE FROM U. S. NAVAL NUCLEAR PROPULSION PLANTS AND THEIR SUPPORT FACILITIES

1983

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Approved by

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Admiral, U. S. Navy
Director, Naval Nuclear
Propulsion Program

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SUMMARY

Radiation exposures to Navy and civilian personnel monitored for radiation associated with U.S. Naval nuclear propulsion plants are summarized in this report. Navy personnel manned seventeen tenders, three submarine bases, 129 nuclear-powered submarines and thirteen nuclear-powered surface ships which were in operation at the end of 1983. Eight shipyards were engaged in construction, overhaul and refueling of these ships. The benefits of nuclear propulsion in our most capable combatant ships have long been recognized, and our nuclear-powered ballistic missile submarines form the most invulnerable element of the United States strategic deterrence.

Figure 1 shows that the total radiation exposure in 1983 is less than one-fourth of the amount in the peak year of 1966, even though the number of nuclear-powered ships has more than doubled and the number of ships in overhaul has tripled since then. Total man-rem in this figure is the sum of the annual exposures of each person monitored for radiation.

No civilian or military personnel in the Naval Nuclear Propulsion Program have ever exceeded the Federal limit which allows five rem exposure for each year of age beyond age eighteen. Since 1967 no person has exceeded the Federal limit which allows up to three rem per quarter year, nor in this period has anyone exceeded the Navy's self-imposed limit of 5 rem per year for radiation associated with Naval nuclear propulsion plants.

No civilian or military personnel in the Naval Nuclear Propulsion Program have ever received more than one tenth the Federal annual occupational exposure limit from internal radiation exposure caused by radioactivity associated with Naval nuclear propulsion plants.

The average occupational exposure of each person monitored has been about one quarter rem per year. The total lifetime exposure from radiation associated with Naval nuclear propulsion plants to date for all personnel monitored since 1954 has averaged about one rem per person.

According to the standard methods for estimating risk, the risk to the group of personnel occupationally exposed to radiation associated with Naval nuclear propulsion plants is less than the risk these same personnel have from exposure to natural background radiation or to medical radiation. This risk is small compared to the risks accepted in normal industrial activities, and it is small compared to the risks regularly accepted in daily life outside work.

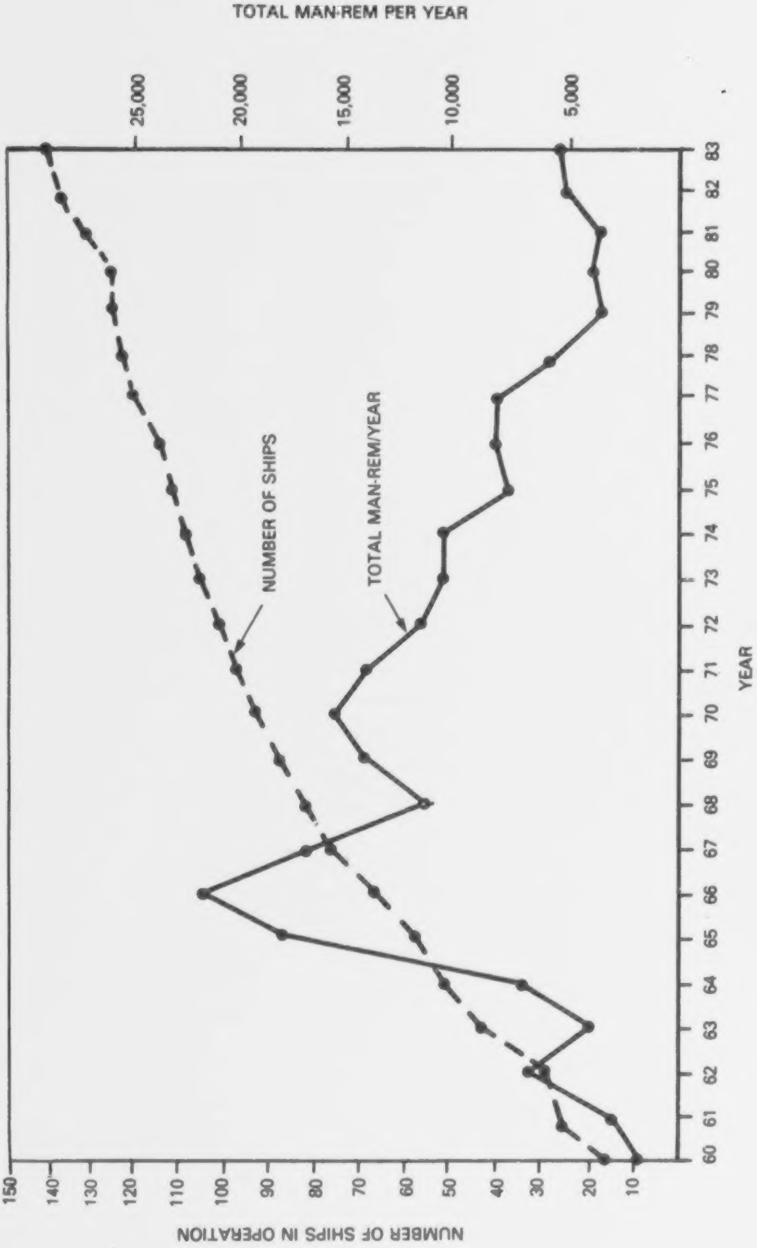

FIGURE 1
TOTAL RADIATION EXPOSURE RECEIVED BY MILITARY AND CIVILIAN PERSONNEL IN THE NAVAL NUCLEAR PROPULSION PROGRAM 1960-1983

EXTERNAL RADIATION EXPOSURE

Policy and Limits

The policy of the U. S. Navy is to reduce as low as reasonably achievable, exposure to personnel from ionizing radiation associated with Naval nuclear propulsion plants.

The radiation exposure limits used in the U. S. and abroad for whole body radiation exposure are 3 rem per quarter year and 5 rem accumulated dose for each year beyond age eighteen. These limits were recommended in 1958 by the U. S. National Committee ("Committee" was changed to "Council" when the organization was chartered by the U. S. Congress in 1964) on Radiation Protection and Measurements (ref 1) and by the International Commission on Radiological Protection (ref 2). They were adopted by the U. S. Atomic Energy Commission (AEC) and applied both within the AEC and to licensees in 1959 (ref 3). The U. S. Federal Radiation Council recommendation that these be used as guidance for Federal agencies was approved by President Eisenhower May 13, 1960 (ref 4). The U. S. Department of Labor adopted these same limits. A key part of each of these standards has been emphasis on minimizing radiation exposure to personnel.

In 1965 the International Commission on Radiological Protection (ref 5) reiterated the quarterly and accumulated limits cited above but suggested that exceeding 5 rem in one year should be infrequent. Although none of the other organizations referred to above changed its recommendations accordingly, the Naval Nuclear Propulsion Program adopted 5 rem per year as a rigorous limit effective in 1967.

In 1971 the National Council on Radiation Protection and Measurements (ref 6) recommended that 5 rem be adopted as the annual limit under most conditions. In 1974 the Atomic Energy Commission (now Department of Energy) (ref 7) established 5 rem as its annual limit. In 1977 the International Commission on Radiological Protection (ref 8) deleted the accumulated limit and recommended 5 rem as the annual limit. In 1979 the Nuclear Regulatory Commission issued a proposed change to the Code of Federal Regulations Title 10, Part 20 to require its licensees to use 5 rem as an annual limit. In January 1981, the Environmental Protection Agency recommended that Federal agencies use 5 rem as an annual limit (ref 9).

The Navy limits for the nuclear propulsion program since 1967 have been:

3 rem per quarter year
5 rem per year

....

References are listed on pages 48 through 50.

Special limits are in effect such as for hands and feet; however, there have been few cases where these limits have been more restrictive than the whole body radiation exposure limits. Therefore, the radiation exposures discussed in this report are nearly all from whole body radiation. Controls are also in effect to minimize any occupational radiation exposure to the unborn child of a pregnant worker.

Each organization in the Navy Nuclear Propulsion Program is required to have an active program to reduce radiation exposure to the minimum practicable.

Source of Radiation

The radiation discussed in this report originates from pressurized water reactors. Water circulates through a closed piping system to transfer heat from the reactor core to a secondary steam system isolated from the reactor cooling water. Trace amounts of corrosion and wear products are carried by reactor coolant from reactor plant metal surfaces. Some of these corrosion and wear products are deposited on the reactor core and become radioactive from exposure to neutrons. Reactor coolant carries some of these radioactive products through the piping systems where a portion of the radioactivity is removed by a purification system. Most of the remaining radionuclides transported from the reactor core deposit in the piping systems.

The reactor core is installed in a heavy-walled pressure vessel within a primary shield. This shield limits radiation exposure from the gammas and neutrons produced when the reactor is at power. Reactor plant piping systems are installed primarily inside a reactor compartment which is surrounded by a secondary shield. Access to the reactor compartment is permitted only after the reactor is shut down. Most radiation exposure to personnel comes from inspection, maintenance and repair inside the reactor compartment. The major source of this radiation is cobalt 60 deposited inside the piping systems. Cobalt 60 emits two high energy gammas and a low energy beta for every radioactive decay. Its half-life is 5.3 years.

Neutrons produced when reactor fuel fissions are shielded by both primary and secondary shields before penetrating to occupied areas. Radiation exposure to personnel from these neutrons during reactor operation has been much less than from gammas. After reactor shutdown, when shipyard and other support facility work is done, no neutron exposure is detectable. As a result, the radiation exposures discussed in this report are nearly all from gamma radiation.

Control of Radiation During Reactor Plant Operation

Reactor plant shielding is designed to minimize radiation exposure to personnel. Shield design criteria establishing radiation levels in various parts of each nuclear-powered ship are personally approved by the Director of the Naval Nuclear Propulsion Program.

Ship design is also controlled to keep locations, such as duty stations where personnel need to spend time, as far as practicable away from the reactor compartment shield. Special attention is paid to living quarters. For example, the shield design criteria were established such that a person would have to spend more than 48 hours per day in living quarters to exceed exposure limits (which is impossible since there are only 24 hours in a day).

Resulting radiation exposure to those aboard ship outside propulsion plant spaces during reactor plant operation is not any greater than natural background radiation. For submarine operating personnel outside the propulsion plant, the combination of low natural radioactivity in ship construction materials and reduced cosmic radiation under water provides less radiation exposure from the nuclear reactor at sea than the public receives ashore. Those who operate the nuclear propulsion plant receive more radiation exposure in port during maintenance and overhaul periods than they receive from operating the propulsion plant at sea.

Control of Radiation in Support Facilities

Tenders for nuclear-powered submarines and surface ships are designed so that radioactive material is handled only in specially designed and shielded nuclear support facilities. Submarine bases and shipyards limit to the minimum, the number of places where radioactive material is allowed. Specific traffic routes are required to be used for any movement of radioactive material outside these nuclear support facilities. A radioactive material accountability system is used to ensure no radioactive material is lost or misplaced in a location where personnel could unknowingly be exposed. Regular inventories are required for every item in the radioactive material accountability system. Radioactive material is tagged with yellow and magenta tags bearing the standard radiation symbol and the measured radiation level. Radioactive material removed from a reactor plant is required to be placed in yellow plastic, and the use of yellow plastic is reserved solely for radioactive material. All personnel assigned to a tender, submarine base or shipyard are trained to recognize that yellow plastic identifies radioactive material and to initiate immediate action if radioactive material is discovered out of place.

Access to radiation areas is controlled by radiological control personnel. Personnel are required to wear dosimetry devices to enter these areas. Dosimetry devices are also posted on the boundaries of these areas to verify that personnel outside these areas do not require monitoring. Frequent radiation surveys are required using instruments which are checked before use and calibrated regularly. Areas where radiation levels are greater than 0.1 rem per hour are called high radiation areas and are locked or guarded.

Dosimetry

Thermoluminescent dosimeters (TLDs) are the dosimetry devices worn by personnel to measure their exposure to gamma radiation. The thermoluminescent dosimeter contains two chips of calcium fluoride with added manganese. It is characteristic of thermoluminescent material that radiation causes internal changes which make the material, when subsequently heated, give off an amount of light directly proportional to the radiation dose. In order to make it convenient to handle, these chips of calcium fluoride are in contact with a metallic heating strip with heater wires extending through the ends of a surrounding glass envelope. The glass bulb is protected by a plastic case designed to permit the proper response to gammas of various energies. Gammas of such low energy that they will not penetrate the plastic case constitute less than a few percent of the total gamma radiation present. To read the radiation exposure, a trained operator removes the glass bulb and places it in a TLD reader so that the metal heater wires contact an electrical circuit. An electronically controlled device heats the calcium fluoride chips to several hundred degrees centigrade in a timed cycle, and the intensity of light emitted is measured and converted to a digital readout in units of rem. The heating cycle also anneals the calcium fluoride chips so that the dosimeter is zeroed and ready for subsequent use. The entire cycle of reading a TLD described here takes about thirty seconds. This rapid readout capability was one reason for changing from film badges to TLD's. The use of TLD's permits more frequent measurement of a worker's radiation exposure than film badges. TLD's are required to be processed at least daily in Naval shipyards. Aboard ship TLD's are required to be processed at least monthly except that daily processing is required for anyone entering a reactor compartment or high radiation area.

To ensure accuracy of the TLD system, several periodic calibration and accuracy checks are performed. For example, TLD's are checked when new and once every six months thereafter for accurate response to a known radiation exposure. Those that fail are discarded or repaired. TLD readers are calibrated once each year to verify accuracy by one of several calibration facilities having precision radiation sources and precision TLD standards. In addition, weekly, daily and hourly checks of proper TLD reader operation and accuracy are performed when readers are in use utilizing internal electronic standards built into each reader.

In addition to these calibrations and checks, the Navy has an independent dosimetry quality assurance program to monitor the accuracy of TLD's and TLD readers in use at program activities. Precision TLD's are pre-exposed to exact values of radiation by the National Bureau of Standards and provided to program activities for reading. The activity's results are then compared to the actual exposures. Simultaneously, a random sample of dosimeters in use at the activity being tested is selected and sent to a Navy shore facility for accuracy testing. To assure objectivity, the activity being tested is not told of the radiation values to which the precision dosimeters have been exposed and is not permitted to participate in the selection of the dosimeter sample. Any inaccuracies found by these tests that exceed established permissible error bands result in appropriate corrective action such as recalibration of a failed TLD reader. The results of this program demonstrate that the radiation to which personnel are exposed is being measured by the TLD system with an average error of less than 10%.

Pocket ionization chambers with an eyepiece permit the wearer to read his own radiation exposure. This pocket dosimeter is required in addition to a TLD when entering a reactor compartment or a high radiation area. Pocket dosimeters are used to enable the wearer to keep track of his own radiation exposure during a work period. The official record of radiation exposure is obtained from the TLD.

Dosimetry devices are worn on the trunk of the body, normally at the waist or chest, whichever will receive the higher exposure. In some special situations dosimeters are worn at other locations, for example on the hands or fingers or head.

Prior to 1974, film badges were used to measure radiation exposure. Film packets like those used for dental X-ray were placed in holders designed to allow differentiating between types of radiation. The darkness of the processed film was measured with a densitometer and converted to units of radiation exposure. When the first personnel radiation exposures were measured in the Naval Nuclear Propulsion Program, there already was widespread photodosimetry experience in the Navy and precise procedures existed to provide reproducible results.

Each film badge was clearly marked with a name or number corresponding to the individual to whom it was assigned. This number was periodically checked by a radiological control technician before a worker entered a high radiation area. In high radiation areas every worker also wore a pocket dosimeter which was read by radiological control personnel when the worker left the area. At the end of each month when the film badges were processed, the film badge measurements were compared with the sum of the pocket dosimeter readings. The film badge results were, with few exceptions, entered in the permanent personnel radiation exposure records.

Discrepancies between film badge and pocket dosimeter measurements were investigated. These investigations included making independent estimates of the worker's exposure using such methods as time spent in the specific radiation area and comparing the estimates with the two measurements to determine which measurement was in error. If the error could not be determined, then the higher exposure was recorded for the worker. In nearly all cases this was the film badge measurement.

Results of numerous tests conducted by shipyards under the same conditions that most radiation exposure was received showed that film measurements averaged fifteen percent higher than actual radiation exposures. This was a conscious conservatism to ensure that under the worst case, the film measurement was not less than the actual radiation exposure. Film response varies with the energy of the gamma radiation. The calibration of the film was performed at high energy where the film has the least response to radiation exposure. Radiation of lower energies corresponding to scattered radiation from shielded cobalt 60 causes the film to indicate more radiation exposure than is present.

Data gathered in over 20 years of neutron monitoring aboard ships using neutron film badges demonstrated that the monitored individuals did not receive neutron exposure above the minimum detection level for neutron film. Naval nuclear-powered ships and their support facilities now use lithium fluoride TLD's to monitor neutron exposure of the few personnel exposed to neutron sources such as for radiation instrument calibration and for reactor plant instrumentation. These measured neutron exposures have been added to gamma exposures in the total whole body radiation exposure in this report, but because neutron exposures are so low, the radiation exposures in this report are nearly all from gamma radiation.

Monitoring for beta radiation is not normally required because betas cannot penetrate the metal boundaries of the reactor coolant system. Beta radiation needs to be considered in maintenance or repair operations only when systems are opened so that personnel are close to surfaces which have been contaminated with radioactive corrosion products from reactor coolant. In these cases normal clothing or eyeglasses or plastic contamination control materials completely shield beta radiation of the energies normally present. Support facilities routinely provide such shielding to eliminate personnel radiation exposure from betas.

Monitoring for alpha radiation is not a normal part of operation or maintenance of Naval nuclear propulsion plants. However, alpha monitoring is sometimes necessary to identify radium daughter products naturally present in the atmosphere.

Physical Examinations

Radiation medical examinations have been required since the beginning of the Naval Nuclear Propulsion Program for personnel exposed to radiation. These examinations are conducted in accordance with the Navy's Radiation Health Protection Manual (ref 10). In these examinations the doctor pays special attention to any condition which might indicate that radiation exposure would cause an increased degree of risk. Passing this examination is a prerequisite for obtaining the dosimetry badge which permits entry to areas where radiation exposure can be received. For military personnel who have already been screened by physical examinations, few fail this radiation medical examination. For civilian shipyard workers, the failure rate is a few percent. However, failure of this examination does not mean a shipyard worker will not have a job. Since shipyard workers spend most of their time on non-radioactive work, inability to qualify for radioactive work does not restrict their job opportunities. No shipyard worker in the Naval Nuclear Propulsion Program has been fired for inability to pass a radiation medical examination.

Radiation medical examinations are given prior to initial radiation work, periodically thereafter (at least every three years), and at termination of radiation work in the nuclear propulsion program (or at termination of employment).

A radiation medical examination includes review of medical history to determine, among other subjects, past radiation exposure, history of cancer, history of radiation therapy, and family history of cancer. In the medical examination particular attention is paid to evidence of cancer. Laboratory procedures include urinalysis, blood analysis, and comparison of blood constituents to a specific set of standards. Chest X-rays with full size film to reduce radiation exposure were also a routine part of all radiation medical examinations until 1977. At that time routine chest X-rays were discontinued, further reducing radiation exposure of workers. Chest X-rays are now performed when clinically indicated at the discretion of the medical officer. In the event disqualifying conditions are found in an examination of Naval civilian or military personnel, the individual is barred from receiving occupational radiation exposure and the results of the examination are reviewed by the Naval Medical Command Radiation Effects Advisory Board. Only after approval of the Board would the individual be permitted to receive occupational radiation exposure.

Shipyard, Tender, and Submarine Base Training

Periodic radiological control training is performed to ensure each person understands the general and specific radiological aspects which he might encounter, understands his responsibility to the Navy and the public for safe handling of radioactive materials, understands the risks associated with radiation exposure and understands his responsibility to minimize his own radiation exposure. Training is also provided on the biological risk of radiation exposure to the unborn child. Prior to being authorized to perform radioactive work, an employee is required to complete satisfactorily a radiological control training course, including a written examination. Typical course lengths for workers range from 16 to 32 hours. In written examinations on radiological controls, short answer questions, such as multiple choice and true-false questions, are not normally used. The following are the minimum training requirements for workers:

1. Radiation Exposure Control

a. State the limits for whole body penetrating radiation. Explain that the rem is a unit of biological dose from radiation.

b. Explain how "stay times" are used.

c. Be aware of the seriousness of violating instructions on radiation warning signs and unauthorized passage through barriers; be aware of penalties for violating these requirements.

d. Discuss procedures and methods for minimizing exposure such as working at a distance from a source, reducing time in a radiation area, and shielding.

e. Discuss potential sources of radiation associated with work performed by the individual's trade.

f. State where dosimetry equipment shall be placed on an individual's body.

g. Demonstrate ability to read all types of dosimeters in use.

h. Discuss importance of the individual keeping track of his own exposure.

i. Be aware of the significance of personnel radiation exposure. The National Council on Radiation Protection and Measurements has stated that while exposures of workers and the general population should be kept to the lowest practicable level at all times, the presently permitted exposures represent a level of risk small compared with other hazards of life. The Nuclear Regulatory Commission has stated, "Control of exposure to radiation is based on the assumption that any exposure, no matter how small, involves some risk." The risk of injury from radiation associated with Naval nuclear propulsion plants is low compared to the occupational and nonoccupational risks accepted in everyday life.

2. Contamination Control

   a. Discuss how contamination is controlled during radioactive work (e.g., containment in plastic bags and use of contamination containment areas).

   b. Discuss procedures for preventing contamination of personnel and how contamination is detected on personnel.

   c. Discuss how contamination is removed from contaminated objects and personnel.

   d. Discuss potential sources of contamination associated with work performed by the individual's trade.

   e. State the beta-gamma surface contamination limit. Discuss the meaning of the units of the limit.

   f. Demonstrate proper procedure for donning and removing a full set of anticontamination clothing.

   g. Demonstrate proper procedures for entering and leaving a contaminated area including proper procedures for self-monitoring.

   h. Explain what radioactive contamination is. Explain the difference between radiation and radioactive contamination.

   i. For personnel required to work in containment areas (e.g., glove bags or tents), demonstrate proper procedures for working in these areas. (This ability is often demonstrated on a mock-up.)

j. For personnel who are likely to encounter airborne radioactivity, demonstrate the proper procedure for donning and removing the type of respiratory equipment the individual will be required to wear. For personnel who are required to wear respiratory equipment with anticontamination clothing, this demonstration shall be performed when donning and removing anticontamination clothing. The demonstration shall include any leak checks required to be made to test for proper operation of respiratory equipment.

k. For personnel who are likely to encounter airborne radioactivity, state the conditions which require wearing masks, air supplied respirators, or air supplied hoods.

3. Accountability of Radioactive Materials - Know that radioactive materials are accounted for when transferred between radiologically controlled areas by tagging, by recording disposition of material, and by specific authorization of radiological control personnel.

4. Waste Disposal - Discuss how individual workers can reduce the amount of radioactive liquid and solid waste.

5. Radiological Incidents

a. Discuss the need for consulting radiological control personnel when questions or incidents occur.

b. Discuss procedures to be followed after a spill of material (liquid or solid) which is or might be radioactive.

c. Discuss procedures to be followed when notified that airborne radioactivity is above the limit.

d. Demonstrate the action to be taken in event of a spill of radioactive liquid. This ability shall be demonstrated during a drill.

e. Discuss the action to be taken when an individual discovers his dosimeter is off-scale.

6. Responsibilities of Individuals - Discuss actions required in order to fulfill workers' responsibilities. Include the responsibility of the individual to inform his employer of previous or concurrent occupational radiation exposure received.

In addition to passing a written examination, completion of this training course requires satisfactory performance during basic types of simulated work operations. For an employee to continue as a radiation worker, he has to requalify in a manner similar to the initial qualification at least every two years. In between these qualification periods, personnel are required to be selected at random for additional examination to determine how well the knowledge has been retained. Training is also conducted by individual shop instructors in the specific job skills for radiation work within each trade. For complex jobs this is followed by special training for the specific job, frequently using mock-ups outside radiation areas.

Radiological control technicians are required to complete a course of six months to one year in length in radiological controls, to demonstrate their practical abilities, and to pass comprehensive written and oral examinations. Radiological control supervisors are required to have at least the same technical knowledge and abilities as the technicians; however, passing scores for supervisors' examinations are higher or supervisors' examinations are more difficult than for technicians. Oral examinations are conducted by senior radiological control managers and require personnel to be able to evaluate symptoms of unusual radiological control situations. The radiological control technician or supervisor is required to evaluate initial symptoms, state immediate corrective action required, state what additional measurements are required, and do a final analysis of the measurements to identify the specific problem. Subsequent to qualification, periodic training sessions are required in which each radiological control technician and supervisor demonstrates ability to handle situations such as are used in the oral examinations. At least every two years, radiological control personnel have to requalify through written and oral examinations similar to those used for initial qualification. Radiological control technicians and supervisors are required to demonstrate their practical abilities frequently through unannounced drills.

In addition to the above training for those who are involved in radioactive work, each shipyard employee not involved in radioactive work and each person assigned to a nuclear-powered ship or a support facility is required to receive basic radiological training which is repeated at least annually. This training is to ensure personnel understand the posting of radiation areas, the identification of radioactive materials, and not to cross radiation barriers. This instruction also explains that the radiation environment of personnel outside radiation areas and outside the ship or shipyard is not significantly affected by nuclear propulsion plant work.

Nuclear Power Training

Military personnel who operate Naval nuclear propulsion plants are required to pass a six month basic training course at nuclear power school and a six month qualification course at a land-based prototype of a shipboard reactor plant. Each nuclear-trained officer and enlisted man receives extensive radiological control training including lectures, demonstrations, practical work, radiological control drills and written and oral examinations. This training has emphasized the ability to apply basic information on radiation and radioactivity.

Those enlisted personnel who will have additional responsibilities for radiological control are designated Engineering Laboratory Technicians and receive an additional three months training after completion of the one year program.

Prior to becoming qualified as the Engineer Officer, that is, the head of the engineering department of a nuclear-powered ship, a nuclear-trained officer must pass a one day written examination and a sequence of oral examinations conducted at the Naval Nuclear Propulsion Program headquarters. A key part of these qualification examinations is radiological controls.

Immediately before serving as Commanding Officer of a nuclear-powered ship, an officer attends a three month course at the Naval Nuclear Propulsion Program headquarters. The radiological controls portion of this is an advanced course and assumes the officer starts with detailed familiarity with shipboard radiological controls. The officer must pass both written and oral examinations in radiological controls during this course prior to assuming command of a nuclear-powered ship.

Radiation Exposure Reduction

Maintaining personnel radiation exposures as low as reasonably achievable involves all levels of management in nuclear-powered ships and their support facilities. Operations, maintenance and repair personnel are required to be involved in this subject; it is not left solely to radiological control personnel. To evaluate the effectiveness of radiation exposure reduction programs, managers use a set of goals. Goals are also set in advance to keep each worker's exposure under certain levels and to minimize the number of workers involved. Goals are also set on the total cumulative personnel radiation exposure (man-rem) for each major job, for the entire overhaul or maintenance period, and for the whole year. These goals are deliberately made hard to meet in order to encourage personnel to improve performance.

Of the various goals used, the most effective in reducing personnel radiation exposure has been the use of exposure control levels which are lower than the Navy's quarterly and annual limits. Control levels in shipyards range from 0.5 rem to 2 rem for the year, depending on the amount of radioactive work scheduled, whereas 5 rem per year is the annual Navy limit.

To achieve the benefits of lower control levels in reducing total man-rem, it is essential to minimize the number of workers permitted to receive radiation exposure. Otherwise the control levels could be met merely by adding more workers. Organizations are required to conduct periodic reviews to ensure the number of workers is the minimum for the work that has to be performed.

The following is a brief checklist which has been in use for years in maintaining personnel radiation exposure as low as reasonably achievable during maintenance, overhaul, and repair.

Preliminary Planning

- Plan in advance
- Delete unnecessary work
- Determine expected radiation levels

Preparation of Work Procedures

- Plan access to and exit from work area
- Provide for service lines (air, welding, ventilation, etc.)
- Provide communication (sometimes includes closed-circuit television)
- Remove sources of radiation
- Plan for installation of temporary shielding
- Decontaminate
- Work in lowest radiation levels
- Perform as much work as practicable outside radiation areas
- State requirements for standard tools
- Consider special tools
- Include inspection requirements (these identify steps where radiological control personnel must sign prior to work proceeding)
- Minimize discomfort of workers
- Estimate man-rem

Temporary Shielding

- Control installation and removal by written procedure
- Inspect after installation
- Conduct periodic radiation surveys
- Minimize damage caused by heavy lead temporary shielding
- Balance radiation exposure received in installation against exposure to be saved by installation
- Shield travel routes
- Shield components with abnormally high radiation levels early in the maintenance period
- Shield position worker occupies
- Perform directional surveys to improve design of shielding by locating sources of radiation
- Use mock-up to plan temporary shielding design and installation

Rehearsing and Briefing

- Rehearse
- Use mock-up duplicating working conditions
- Use photographs
- Brief workers

Performing Work

- Post radiation levels
- Keep excess personnel out of radiation areas
- Minimize beta radiation exposure (anticontamination clothing effectively shields cobalt 60 betas)
- Supervisors and workers keep track of radiation exposure
- Workers assist in radiation and radioactivity measurements
- Delegate radiological control monitoring responsibilities when necessary to minimize radiation exposure
- Evaluate use of fewer workers
- Reevaluate reducing radiation exposures

Additional measures that have been taken to reduce exposure include standardization of procedures, development of new tooling, improved use of temporary shielding, and compliance with strict contamination control measures. For example, most work involving radioactive contamination is performed in total containment. This practice minimizes the potential for spreading contamination and thus reduces work disruptions, simplifies working conditions and minimizes the cost and exposure to clean up.

Lessons learned during radioactive work and new ways to reduce exposure developed at one organization are made available for use by other organizations in the Naval Nuclear Propulsion Program. This effort allows all of the organizations to take advantage of the experience and developments at one organization and minimizes redundant effort.

The extensive efforts that have been taken to reduce exposure in the Naval Nuclear Propulsion Program have also had unplanned benefits, such as reduced cost to perform radioactive work and improved reliability. Efforts such as detailed work planning, rehearsing, total containment, special tools and standardization have resulted in increased efficiency and better access to perform maintenance with the overall result that reliability is improved and costs are reduced.

Radiation Exposure Data

Radioactive materials had been handled in shipyards for years before Naval nuclear propulsion plant work started. Examples of such work include non-destructive testing using radiography sources and radiation instrument calibration using radioactive sources. Since this work is licensed by the Nuclear Regulatory Commission or by a state under agreement with the Nuclear Regulatory Commission, the radiation exposure from this licensed work has been excluded whenever practicable from this report.

Table 1 shows the dates when radioactive work associated with Naval nuclear propulsion plants started in each of eleven shipyards. Seven of these shipyards have constructed Naval nuclear-powered ships; however, little radiation exposure is received in new construction. The dates of starting reactor plant overhaul, therefore, are the significant dates for start of radioactive work.

Table 2 summarizes radiation exposure received in nuclear-powered ships and their supporting tenders and submarine bases since the first nuclear-powered ship went to sea in January 1955. Most of the radiation exposure in this table results from inspection, maintenance and repair work in the reactor compartments of ships. Radiation exposures for reactor compartment work increase as reactor plant radiation levels increase with the age of the plant.

As expected, the number of personnel monitored for exposure to radiation increased with the increasing number of nuclear-powered ships. Initially everyone aboard a nuclear-powered submarine was monitored for occupational radiation exposure. After years of experience showed that personnel outside propulsion plant spaces received exposures indistinguishable from natural background, the number of personnel monitored for occupational exposure to radiation from the propulsion plant was sharply reduced in 1974. For example, in 1973 almost sixty percent of those monitored were recorded as receiving zero radiation exposure; as a result of reducing numbers of personnel monitored unnecessarily, less than ten percent of those monitored for occupational exposure are now recorded with zero exposure. Personnel outside propulsion plant spaces in submarines now wear dosimetry badges to verify they do not receive occupational exposure from the propulsion plant.

Table 3 summarizes radiation exposures of shipyard personnel since the start of Naval nuclear propulsion plant radioactive work in 1954. Figure 2 shows graphically that total personnel radiation exposure has been reduced in shipyards even though the amount of work has increased. Since ship overhauls frequently overlapped calendar years, the numbers of ships in overhaul shown in Figure 2 were determined by dividing by 12 the total number of months each ship was in overhaul during a calendar year.

The increase in the numbers of personnel monitored and total man-rem exposure in the early years shows the increasing workload in reactor plant work as the number of ships increased. By 1962 four submarine reactor plants had been overhauled and major efforts were underway to reduce radiation levels. By 1966 the number of ships in overhaul had quadrupled as indicated by the buildup to the peak in total man-rem. Subsequently, the number of ships in overhaul more than doubled again. Decreases in total annual exposures, numbers of personnel monitored, and numbers of personnel with annual exposures over 2 rem have been as a result of the program to reduce radiation exposures to the minimum practicable. The total annual exposure for the shipyards has averaged less than 6000 man-rem and for ships has averaged less than 2000 man-rem.

Since a worker usually is exposed to radiation in more than one year, the total number of personnel monitored cannot be obtained by adding the annual numbers. The total number of shipyard personnel monitored for radiation exposure associated with the Naval Nuclear Propulsion Program has been about 126,000. Nearly all of these are civilians, about half of whom are U. S. Government employees at six Naval shipyards. Table 4 provides further information about the distribution of their radiation exposures. In 1983, about 90 percent of those monitored for radiation in shipyards and about 99 percent of those in ships received less than 0.5 rem in a year, the limit allowed by Federal regulations for a member of the general public. The average exposure per year for each person monitored has been 0.32 rem in shipyards, which is less than one tenth the occupational exposure limit. The average exposure per year for those monitored in ships has been 0.12 rem, which is less than the average annual exposure a person receives from natural background and medical radiation.

Table 4 also lists the numbers of personnel who have exceeded the 3 rem quarterly exposure limit. In no case have personnel exceeded the accumulated limit of 5 rem for each year of age over eighteen. The total number of persons who have exceeded the quarterly limit since the limit was imposed in 1959 is 37, of whom 4 were military personnel aboard ships. Thirty of the 37 personnel had quarterly exposures in the range of 3 to 4 rem, and the highest exposure was 9.7 rem in a quarter. Navy procedures require any person who receives greater than 25 rem in a short time period to be placed under medical observation. None of the exposures reached this level.

The average lifetime accumulated exposure from radiation associated with Naval nuclear plants for all shipyard personnel is 1.3 rem. Since the average annual exposure per person is 0.32 rem, this means that the average shipyard radiation worker is monitored because of Naval nuclear propulsion plant work for about four years. The average lifetime accumulated exposure for the 55,000 Naval officers and enlisted men trained to operate a nuclear propulsion plant is about 1 rem. These radiation exposures are much less than the exposure the average American receives from medical diagnostic X-rays during his working lifetime.

TABLE 1

SHIPYARD FIRST REACTOR PLANT OPERATION AND FIRST RADIOACTIVE OVERHAUL WORK

Shipyard	Year First New Construction Reactor Started Operation	Year First Reactor Plant Overhaul Started
Electric Boat Division* Groton, Connecticut	1954	1957
Portsmouth Naval Shipyard Portsmouth, New Hampshire	1958	1959
Mare Island Naval Shipyard** Vallejo, California	1958	1962
Pearl Harbor Naval Shipyard Pearl Harbor, Hawaii	None	1962
Charleston Naval Shipyard** Charleston, South Carolina	None	1963
Newport News Shipbuilding Newport News, Virginia	1960	1964
Bethlehem Steel Shipbuilding*** (Subsequently Electric Boat Division) Quincy, Massachusetts	1961	None
New York Shipbuilding Corporation*** Camden, New Jersey	1963	None
Norfolk Naval Shipyard Portsmouth, Virginia	None	1965
Puget Sound Naval Shipyard** Bremerton, Washington	None	1967
Ingalls Shipbuilding Division*** Pascagoula, Mississippi	1961	1970

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* Electric Boat Division performed overhauls in 1957-1977 but only did new construction work again starting in 1978.

** Radioactive work of less extent than in an overhaul commenced in Mare Island in 1958, in Charleston in 1961, and in Puget Sound in 1965.

*** Work on Naval nuclear-powered ships was discontinued at Camden, New Jersey in 1967, at Quincy, Massachusetts in 1969, and at Pascagoula, Mississippi in 1980.

TABLE 2
OCCUPATIONAL RADIATION EXPOSURE RECEIVED BY PERSONNEL ASSIGNED TO TENDERS, BASES, AND NUCLEAR-POWERED SHIPS FROM OPERATION AND MAINTENANCE OF NAVAL NUCLEAR PROPULSION PLANTS

	Number of Persons Monitored Who Received Exposures in the Following Ranges of Rem for the Year						Total Personnel Monitored	Total Man-Rem
Year	0-1	1-2	2-3	3-4	4-5	≥5*		
1954	36	0	0	0	0	0	36	8
1955	90	11	0	0	0	0	101	25
1956	108	10	4	0	0	0	122	50
1957	293	7	1	0	0	0	301	60
1958	562	11	3	0	0	0	576	100
1959	1,057	41	8	3	0	0	1,109	200
1960	2,607	88	8	4	3	1	2,711	375
1961	4,812	106	31	4	4	0	4,957	680
1962	6,788	182	75	31	17	1	7,094	1,312
1963	9,188	197	39	14	3	1	9,442	1,420
1964	10,317	331	93	35	15	4	10,795	1,964
1965	11,883	592	224	96	30	24	12,849	3,421
1966	18,118	541	156	95	44	28	18,982	3,529
1967	21,028	339	139	48	11	0	21,565	3,084
1968	24,200	373	103	20	2	0	24,698	2,463
1969	26,969	577	127	39	6	0	27,718	2,918
1970	26,206	610	134	30	0	0	26,980	3,089
1971	26,090	568	122	31	2	0	26,813	3,261
1972	33,312	602	180	13	1	0	34,108	3,271
1973	30,852	600	102	15	1	0	31,570	3,160
1974	18,375	307	65	2	0	0	18,749	2,142
1975	17,638	330	28	1	0	0	17,997	2,217
1976	17,795	369	56	9	0	0	18,229	2,642
1977	20,236	346	95	36	3	0	20,716	2,812
1978	22,089	290	23	1	0	0	22,403	2,234
1979	21,121	75	1	0	0	0	21,197	1,528
1980	21,767	78	0	0	0	0	21,845	1,494
1981	23,781	27	0	0	0	0	23,808	1,415
1982	27,563	59	0	0	0	0	27,622	1,660
1983	26,843	52	0	0	0	0	26,895	1,805

Note: Data obtained from summaries rather than directly from original medical records. Total man-rem was determined by adding actual exposures for each individual monitored by each reporting command during the year. Total number monitored includes visitors to each reporting command. It is expected that the large effort to compile comparable man-rem data from original medical records would show differences no greater than five percent.

* Limit in the Naval Nuclear Propulsion Program was changed to 5 rem per year in 1967

TABLE 3
OCCUPATIONAL RADIATION EXPOSURE RECEIVED BY SHIPYARD PERSONNEL, FROM WORK ASSOCIATED WITH NAVAL NUCLEAR PROPULSION PLANTS

	Number of Persons Monitored Who Received Exposures in the Following Ranges of Rem for the Year						Total Personnel Monitored	Total Man-Rem
Year	0-1	1-2	2-3	3-4	4-5	≥5*		
1954	508	9	3	5	3	0	528	64
1955	2,563	80	25	6	3	2	2,679	344
1956	2,834	20	5	2	0	1	2,862	162
1957	3,473	97	31	1	2	4	3,608	495
1958	5,766	165	46	10	4	7	5,998	779
1959	10,388	221	133	78	49	23	10,892	1,864
1960	12,047	198	97	22	4	0	12,368	1,158
1961	13,383	198	91	44	14	3	13,733	1,241
1962	14,411	642	366	247	146	108	15,920	5,222
1963	19,164	446	159	71	34	28	19,902	2,725
1964	24,044	804	445	215	144	41	25,693	5,678
1965	22,630	2,306	1314	814	618	525	28,207	15,829
1966	29,490	2,352	1,623	1,057	1,139	513	36,174	18,804
1967	29,853	2,388	1,563	1,096	733	1	35,634	13,908
1968	30,159	1,344	773	496	279	0	33,051	8,719
1969	25,672	1,790	1,080	753	375	0	29,670	11,077
1970	21,182	2,127	1,382	740	492	0	25,923	13,084
1971	20,041	1,928	1,066	650	240	0	23,925	10,616
1972	17,514	1,692	849	139	5	0	20,199	7,002
1973	13,036	1,403	604	203	6	0	15,252	6,083
1974	12,587	1,464	745	311	50	0	15,157	7,206
1975	12,825	1,116	598	82	42	0	14,663	5,285
1976	13,042	1,268	633	30	0	0	14,973	5,310
1977	13,835	1,277	586	25	0	0	15,723	5,199
1978	13,700	1,016	268	0	0	0	14,984	3,680
1979	15,032	227	7	0	0	0	15,266	2,024
1980	15,287	377	0	0	0	0	15,664	2,402
1981	17,414	304	0	0	0	0	17,718	2,310
1982	19,210	648	0	0	0	0	19,858	3,353
1983	20,407	714	0	0	0	0	21,121	3,506

NOTE: Data obtained from summaries rather than directly from original medical records. Total man-rem was determined by adding actual exposures for each individual monitored by each shipyard during the year. Total number monitored includes visitors to each shipyard. It is expected that the large effort to compile comparable man-rem data from original medical records would show differences no greater than five percent.

*Limit in the Naval Nuclear Propulsion Program was changed to 5 rem per year in 1967.

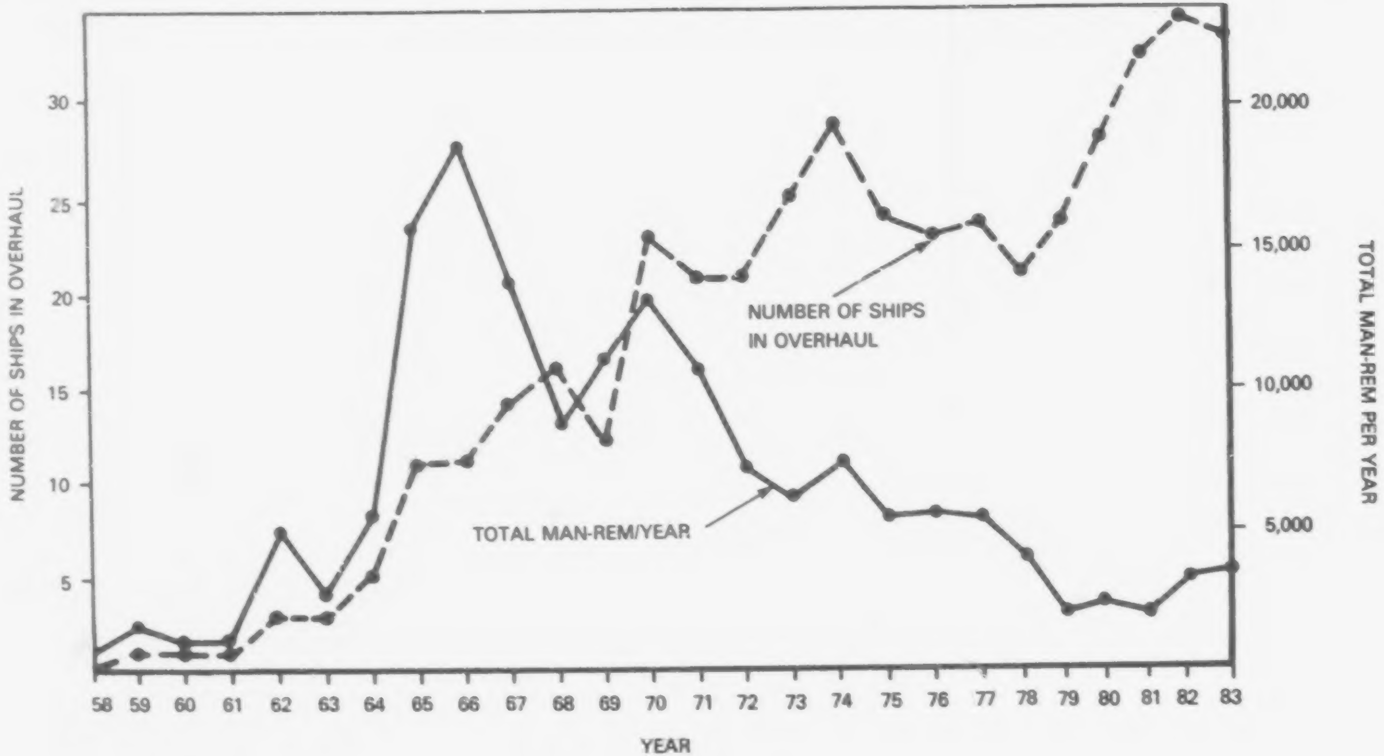

FIGURE 2
TOTAL RADIATION EXPOSURE RECEIVED BY SHIPYARD PERSONNEL FROM WORK ASSOCIATED WITH NAVAL NUCLEAR PROPULSION PLANTS 1958-1983

TABLE 4
SHIPYARD AND FLEET DISTRIBUTION
OF PERSONNEL RADIATION EXPOSURE

Year	Average Rem Per Person Monitored		Percent of Personnel Monitored Who Received Greater Than 1 Rem		Number of Personnel Who Exceeded 3 Rem/Quarter
	Fleet	Shipyard	Fleet	Shipyard	
1954	.22	.12	0	3.8	0
1955	.25	.13	10.9	4.3	0
1956	.41	.06	11.5	1.0	0
1957	.20	.14	2.7	3.7	0
1958	.17	.13	2.4	3.9	0
1959	.18	.17	4.7	4.6	8
1960	.14	.09	7.5	2.6	0
1961	.14	.09	2.9	2.5	0
1962	.18	.33	4.3	9.5	9
1963	.15	.13	2.7	3.7	2
1964	.18	.22	4.4	6.4	4
1965	.27	.56	7.5	19.8	5
1966	.19	.52	4.6	18.5	6
1967	.14	.39	2.5	16.2	3
1968	.10	.26	2.0	8.8	0
1969	.11	.37	2.7	13.5	0
1970	.11	.50	2.9	18.3	0
1971	.12	.44	2.7	16.2	0
1972	.10	.35	2.3	13.3	0
1973	.10	.40	2.3	14.5	0
1974	.11	.48	2.0	17.0	0
1975	.12	.36	2.0	12.5	0
1976	.14	.35	2.4	12.9	0
1977	.14	.33	2.3	12.0	0
1978	.10	.24	1.4	8.5	0
1979	.07	.13	0.4	1.5	0
1980	.07	.15	0.4	2.4	0
1981	.06	.13	0.1	1.7	0
1982	.06	.17	0.2	3.3	0
1983	.07	.17	0.2	3.4	0
Average	.12	.32	2.1	10.6	
NAVYWIDE AVERAGE	.22		6.6		

Table 5 provides information on the distribution of lifetime accumulated exposures for all personnel who were monitored in 1983 for radiation exposure associated with Naval nuclear propulsion plants. Federal radiation exposure limits allow accumulating 100 rem in twenty years of work, or 200 rem in forty years. The fact that no one shown in Table 5 comes close to having accumulated this much radiation exposure is the result of deliberate efforts to keep well below the lifetime accumulated radiation exposure limit.

TABLE 5
DISTRIBUTION OF TOTAL LIFETIME RADIATION EXPOSURE ASSOCIATED WITH NAVAL NUCLEAR PROPULSION PLANTS

RANGE OF ACCUMULATED LIFETIME RADIATION EXPOSURES (REM)	PERCENTAGE OF PERSONNEL MONITORED IN 1983 WITH LIFETIME ACCUMULATED RADIATION EXPOSURE IN THE RADIATION RANGE	
	FLEET	SHIPYARDS
0 - 5	99.03	85.93
5 - 10	0.90	6.84
10 - 15	0.06	3.32
15 - 20	0.01	1.92
20 - 25	0	1.05
25 - 30	0	0.69
30 - 50	0	0.25
Greater than 50	0	0

Table 6 provides a basis for comparison between the radiation exposure for light water reactors operated by the Navy and commercial power reactors licensed by the Nuclear Regulatory Commission. The 1982 data in this Nuclear Regulatory Commission table covers 74 licensees with a total of 52,190 man-rem (ref 11). The 1982 average annual exposure of each worker at commercial power reactors was 0.40 rem.* Licensees of commercial power reactors reported 253 overexposures to external radiation during the years 1971 through 1982. Numbers in excess of 5 rem are not necessarily overexposures since Nuclear Regulatory Commission regulations permit exposures of 3 rem each quarter up to 12 rem per year within the accumulated total limit of 5 rem for each year of a person's age beyond eighteen.

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*This average was calculated by dividing total man-rem by total number of workers monitored as is done in Table 4. Ref (11) reports this value as 0.62; however, it is calculated by dividing the total man-rem by the number of workers with measurable exposure.

TABLE 6
PERSONNEL
RADIATION EXPOSURE FOR COMMERCIAL NUCLEAR-POWERED REACTORS LICENSED
BY U.S. NUCLEAR REGULATORY COMMISSION

SUMMARY OF ANNUAL WHOLE BODY EXPOSURE BY INCREMENT

			NUMBER OF INDIVIDUALS												
			EXPOSURE INCREMENT - REM												
YEAR	TOTAL MONITORED	NOT MEASURABLE	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	>10	TOTAL MAN-REM	NUMBER OF OVER-EXPOSURES
1969	2,838	2,607			134	65	25	5	2	0	0	0	0		
1970	7,509	6,985			166	163	88	98	8	1	0	0	0		
1971	9,581	8,996			315	137	105	17	11	0	0	0	0		2
1972	15,713	14,783			532	199	111	46	21	9	6	6	0		16
1973	33,823	19,043	9,798	2,468	1,584	422	251	71	38	16	7	0	0	13,963	19
1974	38,938	20,472	13,766	2,503	1,378	471	226	86	30	6	0	0	0	13,722	43
1975	44,343	18,852	18,289	3,984	1,872	691	423	169	60	24	12	0	1	20,879	14
1976	61,151	25,704	24,606	4,880	2,354	789	487	188	70	26	11	5	1	26,433	20
1977	67,134	24,868	31,298	6,162	2,837	1,130	569	141	66	36	21	6	0	32,511	27
1978	76,121	30,143	34,983	6,405	2,989	1,080	418	67	26	8	0	0	2	31,804	9
1979	105,313	41,191	51,056	7,898	3,306	1,255	477	86	28	13	2	0	1	39,981	21
1980	127,708	47,377	61,808	11,474	4,515	1,537	686	192	98	18	3	0	0	53,796	73
1981	124,506	42,323	63,403	11,766	4,546	1,793	486	93	81	11	2	1	1	54,142	7
1982	129,275	44,893	66,521	10,855	4,686	1,814	432	56	13	4	0	1	0	52,190	2

SOURCE: NUREG-0713, Vol. 4, "Occupational Radiation Exposure at Commercial Nuclear Power Reactors 1982."

INTERNAL RADIOACTIVITY

Policy and Limits

The Navy's policy on internal radioactivity for personnel associated with the nuclear propulsion program continues to be the same as it was more than two decades ago--to prevent significant radiation exposure to personnel from internal radioactivity. The limits invoked to achieve this objective are one-tenth of the levels allowed by Federal regulations for radiation workers. The results of this program have been that no one has received more than one-tenth the Federal annual internal occupational exposure limits from internal radiation exposure caused by radioactivity associated with Naval nuclear propulsion plants.

The basic Federal limit for radiation exposure to organs of the body from internal radioactivity has been 15 rem per year. There have been higher levels applied at various times for thyroid and for bones; however, use of these specific higher limits has not been necessary in the Naval Nuclear Propulsion Program.

Fifteen rem per year is the limit recommended for most organs of the body by the U. S. National Committee on Radiation Protection in 1954 (ref 1), by the U. S. Atomic Energy Commission in the initial edition of ref 3 applicable in 1957, by the International Commission on Radiological Protection in 1959 (ref 2), and was adopted for Federal agencies when President Eisenhower approved recommendations of the Federal Radiation Council May 13, 1960. Although the International Commission on Radiological Protection revised its recommendations in 1977 (ref 8) to raise limits for most organs,the Naval Nuclear Propulsion Program has not changed the limits.

Source of Radioactivity

Radioactivity can get inside the body through air, through water or food, and through surface contamination via the mouth, skin, or a wound. The radioactivity of primary concern is the metallic corrosion products on the inside surfaces of reactor plant piping systems. These are in the form of insoluble metallic oxides, primarily iron oxides. Ref (12) contains more details on why cobalt 60 is the radionuclide of most concern for internal radioactivity.

The design conditions for reactor fuel are much more severe for warships than for commercial power reactors. As a result of being designed to withstand shock, naval reactor fuel elements retain fission products including fission gases within the fuel. Sensitive measurements are made frequently to verify the integrity of reactor fuel. Consequently, fission products such as strontium 90 and cesium 137 make no measurable contribution to internal exposure of personnel from radioactivity associated with Naval nuclear propulsion plants. Similarly, alpha emitters such as uranium and plutonium are retained within the fuel elements and are not accessible to personnel operating or maintaining a Naval nuclear propulsion plant.

Because of the high integrity of reactor fuel and because soluble boron is not used in reactor coolant for normal radioactivity control in Naval reactors, the amounts of tritium in reactor coolant are far less than in typical commercial power reactors. The small amounts that are present are formed primarily as a result of neutron interaction with the deuterium naturally present in water. The radiation from tritium is of such low energy that the Federal limits for breathing or swallowing tritium are one hundred times higher than for cobalt 60. As a result radiation exposure to personnel from tritium is far too low to measure. Similarly, the low energy beta radiation from carbon 14 does not add measurable radiation exposure to personnel operating or maintaining Naval nuclear propulsion plants.

Control of Airborne Radioactivity

Airborne radioactivity is controlled in maintenance operations such that masks are not normally required. To prevent exposure of personnel to airborne radioactivity when work might expose radioactivity to the atmosphere, contamination containment tents or bags are used. The areas inside these containments are ventilated to the atmosphere through high efficiency filters which have been tested to remove at least 99.95 percent of particles of a size comparable to cigarette smoke. The occupied area outside these containments is required to be ventilated through high efficiency filters any time work which could cause airborne radioactivity is in progress inside an area such as a reactor compartment. Airborne radioactivity surveys are required to be performed regularly in radioactive work areas. Any time airborne radioactivity above the limit is detected in occupied areas, work which might be causing airborne radioactivity is stopped. This conservative action is taken to minimize internal radioactivity even though the Navy's airborne radioactivity limit would allow continuous breathing for forty hours per week throughout the year to reach an annual exposure to the lungs of one-tenth the Federal limit. Personnel are also trained to use masks when airborne radioactivity above the limit is detected. However, masks are seldom needed and are not relied upon as the first line of defense against airborne radioactivity.

It is not uncommon for airborne radioactivity above the limit to be caused by radon naturally present in the air. Atmospheric temperature inversion conditions can allow this buildup of radioactive particles from radon. Radon can build up above the limit in sealed or poorly ventilated rooms in homes or buildings made of stone. Most cases of airborne radioactivity above the limits in occupied areas in the Naval Nuclear Propulsion Program have been caused by radioactive particles from radon and not from the reactor plant. Procedures have been developed to allow work to continue after it has been determined that the elevated airborne radioactivity is from naturally occurring radon.

Radon is also emitted from radium used for making dials luminous. There have been a number of cases where a single radium dial such as on a wristwatch has caused the entire atmosphere of a submarine to exceed the airborne radioactivity limit used for the nuclear propulsion plant. Radium in any form has been banned from submarines to prevent interference with keeping airborne radioactivity from the nuclear propulsion plant as low as practicable.

Control of Radioactive Surface Contamination

Perhaps the most restrictive regulations in the radiological control program are established in the requirements for the control of radioactive contamination. Work operations involving potential for spreading radioactive contamination are planned using containment to prevent personnel becoming contaminated. The controls for radioactive contamination are so strict that precautions sometimes have had to be taken to prevent tracking contamination from fallout and natural sources into nuclear areas because the contamination control limits used in the nuclear areas were below the levels of fallout and natural contamination occurring outside in the general public areas.

Anticontamination clothing, including coveralls, hood (to cover the head, ears and neck), shoe covers and gloves, is provided when needed. However, the basic approach is to avoid the need for anticontamination clothing by containing the radioactivity. As a result, most work on radioactive materials is performed with hands reaching into gloves installed in containments, making it unnecessary for the worker to wear anticontamination clothing. In addition to providing better control over the spread of radioactivity, this method has reduced radiation exposure since the worker can usually do his job better and faster in his normal work clothing. A basic requirement of contamination control is monitoring all personnel leaving any area where radioactive contamination could possibly occur. Workers are trained to survey themselves, and their performance is checked by radiological control personnel. Personnel monitor before, not after, they wash. Therefore, washing or showering at the exit of radioactive work areas is not required. The basic approach is to prevent contamination, not wash it away.

Surveys for radioactive contamination are taken frequently by trained radiological control personnel. Results of these surveys are reviewed by supervisory personnel to provide a double-check that no abnormal conditions exist. The instruments used for these surveys are checked against a radioactive calibration source daily and prior to use, and they are calibrated at least every six months.

Control of Food and Water

Smoking, eating, drinking and chewing are prohibited in radioactive areas. Aboard ship, drinking water is distilled from seawater by using steam. However, the steam is not radioactive because it is in a secondary piping system separate from the reactor plant radioactive water. In the event radioactivity were to leak into the steam system, sensitive radioactivity detection instruments which operate continuously would give early warning.

Wounds

Skin conditions or open wounds which might not readily be decontaminated are cause for disqualification from doing radioactive work. Workers are trained to report such conditions to radiological control or medical personnel, and radiological control technicians watch for open wounds when workers enter radioactive work areas. In the initial medical examination prior to radiation work and during subsequent examinations, skin conditions are also checked. If the medical officer determines a wound is sufficiently healed or considers the wound adequately protected, he may remove the disqualification.

There have been only a few cases of contaminated wounds in the Naval Nuclear Propulsion Program. In most years, none occurred. Examples of such injuries which have occurred in the past include a scratched hand, a metallic sliver in a hand, a cut finger, and a puncture wound to a hand. These wounds occurred at the same time the person became contaminated. Insoluble metallic oxides which make up the radioactive contamination remain primarily at the wound rather than being absorbed into the blood stream. These radioactively contaminated wounds have been easily decontaminated. No case of a contaminated wound is known where the radioactivity initially present in the wound was as much as one one-thousandth of that permitted for a radiation worker to have in his body.

Monitoring for Internal Radioactivity

The radioactivity of most concern for internal radiation exposure from Naval nuclear propulsion plants is cobalt 60. Although most radiation exposure from cobalt 60 inside the body will be from beta radiation, the gammas given off make cobalt 60 easy to detect. Complex whole body counters are not required to detect cobalt 60 at low levels inside the body. For example, one millionth of a curie of cobalt 60 inside the lungs or intestines will cause a measurement of two times above the background reading with a standard radiation survey instrument. This amount of internal radioactivity will cause the instrument used to monitor personnel for radioactive contamination on their body to reach the alarm level. Every person is required to monitor his entire body every time he leaves an area with radioactive surface contamination. Monitoring the entire body is a requirement in the Naval Nuclear Propulsion Program; monitoring just hands and feet is not permitted. Therefore, if a person had as little as a millionth of a curie of cobalt 60 inside him, it would readily be detected.

Swallowing one millionth of a curie of cobalt 60 will cause internal radiation exposure of about 0.06 rem. The radioactivity will pass through the body and be excreted within a period of a little more than one day.

One millionth of a curie of cobalt 60 deposited in the lungs as a result of an inhalation incident is estimated to cause a radiation exposure of about 3 rem to the lungs over the following year based on standard calculational techniques recommended by the International Commission on Radiological Protection (ref 13). These techniques provide a convenient way to estimate the amount of radiation exposure a typical individual might be expected to receive from small amounts of internally deposited radioactivity. These techniques account for the gradual removal of cobalt 60 from the lungs through biological processes and the radioactive decay of cobalt 60 with a 5.3 year half life. However, if an actual case were to occur, the measured biological elimination rate would be used in determining the amount of radiation exposure received.

In addition to the control measures to prevent internal radioactivity and the whole body monitoring frequently performed on those who work with radioactive materials, more sensitive monitoring is also performed during radioactive overhaul work. Shipyard procedures for monitoring internal radioactivity use the type of scintillation detectors which will reliably detect an amount of cobalt 60 inside the body that is more than one hundred times lower than the one millionth of a curie used in the examples above. Shipyards typically monitor for internal radioactivity as part of each radiation medical examination, performed before an employee initially performs radiation work, after he terminates radiation work, and periodically in between. Shipyards also monitor periodically during the year groups of personnel who did the work most likely to have caused spread of radioactive contamination. Any person who has radioactive contamination above the limit anywhere on the skin of his body during regular monitoring at the exit from a radioactive area is monitored for internal radioactivity with the sensitive detector. Also any person who might have breathed airborne radioactivity above limits is monitored with the sensitive detector.

Results of Internal Monitoring in 1983

During 1983 over 10,000 personnel were monitored for internally deposited radioactivity using sensitive scintillation detectors at the eight shipyards performing work associated with Naval nuclear propulsion plants. Equipment and procedures provide detection levels at least one hundred times lower than one-millionth of a curie. No person had internal radioactivity above this level.

EFFECTS OF RADIATION ON PERSONNEL

Control of radiation exposure in the Naval Nuclear Propulsion Program has always been based on the assumption that any exposure, no matter how small, involves some risk; however, exposure within the accepted exposure limits represents a risk small compared with normal hazards of life. The basis for this statement is presented below.

Exposure to Radiation Involves Some Risk

Since the inception of nuclear power, scientists have cautioned that exposure to ionizing radiation in addition to that from natural background involves some risk. The National Committee on Radiation Protection and Measurements in 1954 (ref 1) and the International Commission on Radiological Protection in 1958 (ref 2) both recommended that exposures should be kept as low as practicable and that unnecessary exposure should be avoided to minimize this risk. The International Commission on Radiological Protection in 1962 (ref 14) explained the assumed risk as follows:

> "The basis of the Commission's recommendations is that any exposure to radiation may carry some risk. The assumption has been made that, down to the lowest levels of dose, the risk of inducing disease or disability in an individual increases with the dose accumulated by the individual, but is small even at the maximum permissible levels recommended for occupational exposure."

The National Academy of Sciences-National Research Council Advisory Committee on the Biological Effects of Atomic Radiation included similar statements in its reports in the 1956-1961 period. In 1960, the Federal Radiation Council stated in ref 4 that its radiation protection guidance did not differ substantially from recommendations of the National Committee on Radiation Protection and Measurements,the International Commission on Radiological Protection, and the National Academy of Sciences.

One conclusion from these reports is that radiation exposures to personnel should be minimized. This is not a new conclusion. It has been a major driving force of the Naval Nuclear Propulsion Program.

Studies of the Effects of Radiation on Humans

Tens of thousands of reports have been written on the effects of radiation. Even the list of summary reports is voluminous. In spite of the fact that there are many unanswered questions concerning the effects of radiation on humans, more is known about radiation than almost any substance that can affect humans. More money has been spent to learn the effects of radiation on humans than for any other hazard in our modern society. In fact, the National Academy of Sciences in ref 15 stated: "It is fair to say that we have more scientific evidence on the hazards of ionizing radiation than most, if not all, other environmental agents that affect the general public."

The main effect is cancer. Effects other than cancer have not been found for low-level radiation exposure to adults. The following brief summary of the effects of low-level whole body external radiation is primarily from refs 15 and 16.

The most important data on the effects of whole body external radiation exposure on humans comes from the almost 30 years of extensive study of the Japanese atomic bomb survivors. In addition, studies have been made of the Marshall Islands inhabitants who received about 12,000 man-rem from fallout in 1954. Studies have been made on groups of patients who have had frequent diagnostic x-ray examinations. Numbers of studies have been made on patients who have had radiation therapy for a disease of the bones of the back and for other conditions. These studies predominantly involved radiation doses of greater than 100 rem. The determinations of damage from doses greater than 100 rem have been reasonably consistent from numerous different studies. Extensive irradiation studies of animals have also been used to show what to look for in humans. These animal studies also show under controlled conditions not available in studies on humans how the radiation effects change with amount and frequency of radiation exposure.

Results of radiation studies on humans show the highest rates of cancer occur in the thyroid and the female breast, although the death rate for thyroid cancer is low. The cancer rates from radiation are lower for leukemia and lung cancer, and lower still for cancers of the bone and other organs. Leukemia has been associated with radiation exposure in almost every study of radiation on humans. Reasons for this include the improved diagnosis of leukemia in recent decades and the low natural incidence of leukemia compared to other cancers. However one type of leukemia, chronic lymphatic leukemia, has not been found in any study to be associated with radiation. Some organs appear to be so resistant to radiation-induced cancer that there has been no clear association between radiation and cancer in these organs. One example is the prostate gland.

One characteristic of cancer caused by low-level radiation is the long delay time between time of radiation exposure and time of diagnosis of cancer. Cancer is not diagnosed until more than a few years have elapsed. In the Japanese atomic bomb survivors, the end of the latent period for leukemia was about 25 years. For the sum of all types of cancers ref 16 assumes that in 25 years one-half the cancers will have occurred.

Cataracts of the eyes can be caused by radiation. However, cataract formation appears to have more evidence of having a threshold radiation dose than any other radiation damage studied. Very high radiation doses have been required to produce cataracts. Ref 15 states that single exposures of 200 to 500 rem or fractionated exposures of 1,000 rem are the threshold exposures required to produce damage to the lens of the eye sufficient to interfere with vision.

Genetic effects can also be caused by radiation. However, genetic effects greater than the natural incidence rate have not been demonstrated in human populations exposed to radiation. Genetic effects are changes in human genes that do not pose a risk to the parent but could cause birth defects in offspring. The current natural rate of genetic effects is approximately 10 percent of all live births and range from trivial effects, such as hair and eye color changes, to more serious disorders. No increase in the natural rate of genetic effects has been found in studies of the 35,000 children conceived by parents irradiated as a result of the nuclear explosions in Hiroshima and Nagasaki in 1945.

Sterility, which is not a genetic effect, can be caused by radiation. However, according to ref 15, the radiation exposure required to cause sterility in males is very high, probably in excess of lethal exposures. Scientific reports of several decades ago speculated that radiation might cause a general effect that would shorten life, similar to aging. Reports in the last decade conclude such an effect has not been found in studies on humans. Nor have numerous other diseases such as heart disease been associated with radiation in these studies. To date the chief effect of radiation on humans has been found to be cancer.

In 1980, the National Institute for Occupational Safety and Health issued a report (ref 17) concerning the health of Portsmouth Naval Shipyard workers.

In 1978, Dr. T. Najarian, assisted by the Boston Globe, issued a sensationalized report which alleged that Portsmouth Naval Shipyard (PNS) workers who were occupationally exposed to low-level radiation suffered twice the expected rate of overall cancer deaths and five times the expected rate of leukemia deaths. This report was based on an informal review of several hundred death records, without any official input. It caused a number of frightening news stories. NIOSH was subsequently directed by Congress to investigate Dr. Najarian's report.

Under contract with NIOSH, Dr. Najarian's study was repeated using data the Navy made available to NIOSH. In June 1979, Dr. Najarian testified before Congress on the results of the reanalysis based on official data. In his testimony Dr. Najarian repudiated his earlier findings of increased overall cancer and leukemia. His third finding of increased blood cancers was separately repudiated at that time by the National Cancer Institute.

In December 1980, NIOSH finished their investigation based on approximately 25,000 Portsmouth Naval Shipyard (PNS) workers and issued a final report. This report states that NIOSH found no excess of deaths due to leukemia or other cancers among the Shipyard workers. This report specifically states:

> "No relationship between exposure to radiation and mortality from any cause was observed among the PNS population when compared to the United States white male population. Furthermore, no excess in leukemia mortality was observed in the radiation exposed population when compared to the non-radiation exposed employees of PNS."

Thus, the earlier reports of excess cancer rates among Portsmouth Naval Shipyard workers exposed to low-level radiation were not substantiated by NIOSH.

The Department of Energy is sponsoring a more comprehensive shipyard epidemiologic study. The study is being performed by Johns Hopkins University and will include radiation workers in all shipyards doing Naval nuclear propulsion plant work so that its findings will be based on a much larger population. Because of the size of the study, results are not expected for several years.

Numerical Estimates of Risk from Radiation

In 1972, both the United Nations Scientific Committee on the Effects of Atomic Radiation and the National Academy of Sciences-National Research Council Advisory Committee on the Biological Effects of Ionizing Radiations issued reports (refs 18 and 19) which estimated numerical risks for specific types of cancer from radiation exposure to humans. In 1977, both the International Commission on Radiological Protection and the United Nations Scientific Committee on the Effects of Atomic Radiation issued reports (refs 8 and 16) reconfirming these risk estimates. The risk estimates from both refs 8 and 16 can be briefly summarized as follows:

> In a large population group (such as 100,000 people) receiving an annual total of 10,000 man-rem year after year, the increased risk from this radiation appears to be in the region of about one fatal cancer case each year and about one leukemia case every five years in excess of the normal numbers of cases.

This can be used to develop a risk estimate for personnel exposed to radiation associated with Naval nuclear propulsion plants. In all shipyards there have been a total of about 126,000 personnel monitored for exposure to radiation, and their exposure rate has averaged less than 6,000 man-rem per year. Therefore, there should be less than one excess fatal cancer per year and less than one excess leukemia case every five years among the total 126,000 shipyard personnel who have ever been monitored for radiation associated with Naval nuclear propulsion plants.

According to refs 8 and 16, this risk estimate is likely to be substantially overstated because the radiation exposures are from gamma radiation at low doses and low dose rates. Also, exposure to neutrons and exposure from internal radioactivity in the Naval Nuclear Propulsion Program are too low to have the confusing effects noted in some studies of the effects of radiation on humans. The National Academy of Sciences National Research Council Committee on Biological Effects of Ionizing Radiation issued a report in 1980 (ref 15) which also stated that the risk estimates in refs 8 and 16 for low-level exposure may be overestimated. This report recommended that the risk of dying of cancer from low-level radiation exposure be estimated based on a model which yields lower risk estimates than those reported in refs 8 and 16. For simplicity, the discussion which follows will use the earlier conservative estimates in refs 8 and 16.

Radiation exposure received by Naval personnel assigned to nuclear-powered ships and their support facilities has averaged less than 2000 man-rem per year. Therefore, according to refs 8 and 16 there should be less than one excess fatal cancer every five years and less than one excess leukemia case every twenty-five years among the approximately 55,000 Naval personnel who have ever been monitored for occupational exposure to radiation associated with Naval nuclear propulsion plants. Since only a few percent of the total man-rem to ship personnel is from neutrons, the same qualifications apply as were mentioned for shipyard personnel, and this risk estimate is likely to be substantially overestimated.

Radiation Exposure Comparisons

To help put this risk estimate in perspective, comparisons are needed. For example, in a typical group of 10,000 people in the U. S., a total of 1600 will die of cancer (ref 20). If each of the 10,000 received over his lifetime one rem more than he was already receiving from background and medical sources, then according to the preceding risk estimate one extra person would die of cancer. Therefore, the 1,600 cancer deaths would increase to 1601 for this group of 10,000. This example is directly applicable to the Naval Nuclear Propulsion Program where the average lifetime occupational radiation exposure is one rem.

However, a few highly controversial studies have concluded that more people would die from radiation than the National Academy of Sciences and United Nations committees predict. If the higher risk estimate of one well known study is applied to the same population group of 10,000, then the 1,600 cancer deaths would increase to 1,610.

The current controversy over effects of low-level radiation is whether one extra rem to each of 10,000 people will cause the normal number of 1,600 cancer deaths to increase to 1,601, or to 1,610. The 1,601 figure is the current best estimate. Studies are now underway to attempt to refine the accuracy of the estimates.

The following examples give further perspective on what radiation exposure means:

- Of all industrial and medical radiation workers in the United States, about 15,000 die each year from cancer. It is estimated that only 25 additional cancer deaths occur per year as a result of radiation exposure from their work.
- Radiation from the nuclear accident at Three Mile Island may add one fatal cancer death to the public within fifty miles. Of the two million people living within this fifty mile radius, more than 300,000 are expected to die of cancer from causes other than the radioactivity released from this accident.
- The average occupational radiation exposure of all those monitored in the Naval Nuclear Propulsion Program is about 0.22 rem per year. This is only slightly greater than the average radiation exposure received in the U. S. each year from natural background and medical x-rays. (Derived from ref 21).
- The average lifetime occupational radiation exposure of one rem for personnel in the Naval Nuclear Propulsion Program is less than one tenth the amount of radiation exposure these same personnel will average over their lifetimes from natural background and medical x-rays. (Derived from ref 21).
- This one rem average lifetime occupational radiation exposure can also be compared very roughly to the 5 rem received in a year from smoking one pack of cigarettes per day. This comparison is not exact because it requires more lung exposure from natural radioactivity in tobacco to cause the same amount of risk as whole body gamma radiation. (ref 22)
- The risk of dying from an automobile accident is forty or more times higher than the risk of fatal cancer for the average person with 1 rem lifetime radiation exposure.

The total occupational radiation exposure of 5,311 man-rem received by all personnel in the Naval Nuclear Propulsion Program in 1983 can be compared to the many other sources of radiation exposure received by the U. S. population. Examples follow:

- 20,000,000 man-rem to the population of the U. S. each year from natural background radiation (ref 21).
- 17,000,000 man-rem to the population of the U. S. each year from medical and dental radiation (ref 21).
- 650,000 man-rem to the population of the U. S. each year from radioactivity in natural gas used for cooking (ref 22).
- 100,000 man-rem the one million inhabitants of Denver could save each year if they moved to a region such as Washington, D. C. with lower natural background radiation levels (Derived from ref 21).
- 12,000 man-rem total to passengers in jet airplane flights in the United States from increased cosmic radiation at the higher altitudes used by jets (ref 23).

Thus, the total occupational radiation exposure received by all personnel in 1983 is about one ten-thousandth of the total radiation exposure received by the U. S. population from all sources. The risk from occupational radiation exposure in the Naval Nuclear Propulsion Program is also less than the risks these same personnel face from natural background radiation or from medical radiation. To demonstrate this, the 126,000 personnel monitored for radiation in all shipyards over the last 30 years will receive about 12,600 man-rem per year from natural background and about the same from medical radiation. The average occupational exposure to this group has been less than 6,000 man-rem per year.

Risk estimates for radiation should also be compared to other risks normally encountered in industrial activities, using the following table for example:

DEATH RATES IN U. S. FOR VARIOUS CAUSES

CAUSE	ANNUAL DEATHS PER 100,000 POPULATION
Smoking (ref 24)	150
Motor Vehicle accidents (ref 25)	22
Work accidents (ref 25)	
Mining, quarrying	63
Construction	57
Agriculture	54
Transportation and Public Utilities	31
All Industries Average	14
Government	11
Services	9
Manufacturing	9
Trade	6
Industrial accidents in a Naval Shipyard (eight shipyards 1972-1977)	7
Commercial air travel (ref 25)	1
Coal-fired electric power (estimate derived from ref 26)	1 to 10
Radiation associated with Naval Nuclear propulsion plants (risk estimate)	Less than 1

Because of these estimates on the risk of low-level radiation, extra hazard pay for radiation work has never been paid in the Naval Nuclear Propulsion Program. Civil Service Commission regulations do not provide for hazard pay for radiation work. A serious disadvantage to extra pay for radiation risks is that it would tend to increase the difficulty in minimizing radiation exposure because some personnel would press for more radiation to maximize their pay.

Extrapolations

In radiation, as in other areas, a most effective way to frighten people is to proclaim that no one knows what the effects are. This has been repeated so often that it has almost become an article of faith that no one knows the effects of low-level radiation on humans.

One could well state, "No one knows the risks of smoking a few cigarettes," but the risks of smoking a large number of cigarettes are well known. If 10,000 people smoke an average of four cigarettes a day, about 100 deaths will result; data are not available for lower smoking rates. For radiation, doses of 100 rem to each of 10,000 people would be required to cause an equal number of deaths. The effects of radiation on humans at doses of 100 rem are well known. The controversy over radiation risks today is how to extend the risk estimates to even lower levels. As we get to lower levels, it becomes more and more difficult to detect the effects.

The figures just presented can be extended to show that one rem has about the same risk of death as smoking one cigarette per month. This comparison is only to show that finding out the effect on the death rate of one rem of exposure is about the same as trying to find out the effect of smoking one cigarette a month.

In summary, the effect of one rem is extremely small. There are physical limits to how far scientists can go to ascertain precisely the size of this risk, but it is known to be small. Instead of proclaiming how little is known about low-level radiation, it is more appropriate to emphasize how much is known about the small actual effects.

Conclusions on the Effects of Radiation on Personnel

This perspective provides a better position to answer the question, "Is radiation safe?" If safe means zero effect, then the conclusion would have to be that radiation is unsafe. But to be consistent, background radiation and medical radiation would also have to be considered unsafe. Or more simply, being alive is unsafe.

"Safe" is a relative term. Comparisons are necessary for actual meaning. For a worker, safe means the risk is small compared to other risks accepted in normal work activities. Aside from work, safe means the risk is small compared to other risks routinely accepted in life.

Each recommendation on limits for radiation exposure from the key organizations referenced has emphasized the need to minimize radiation exposure. Thus, the Navy is committed to keeping radiation exposure to personnel as low as reasonably achievable. No level of radiation exposure has been identified for which responsible organizations have stated there is no effect. Similarly it is difficult to find a single activity of man for which one can confidently state the risk is zero. However, the above summaries show that the risk from radiation exposure associated with Naval nuclear propulsion plants is low compared to hazards normally accepted in industrial work and in daily life outside of work.

CLAIMS FOR RADIATION INJURY TO PERSONNEL

Personnel who consider they have or might have had occupational injury may file claims. Naval shipyard personnel are employees of the U. S. Government and therefore file claims with the U. S. Department of Labor's Office of Workmen's Compensation. Shipyards hold no hearings on injury claims. They are not handled in an adversary procedure. The Navy has no rights to present a case to the Labor Department. The claim does not even have to be filed through the shipyard. The shipyard is not permitted to appeal a decision, but the employee may appeal. The primary consideration in the Federal laws and procedures set up for injury compensation is to take care of the Federal employee. The program to compensate Federal employees is well publicized.

In private shipyards injury compensation claims are handled under the Longshoreman's and Harbor Workers' Compensation Act. The claim may be handled through the shipyard's insurance carrier or by a U. S. Department of Labor claims examiner. Either the employee or the employer may appeal.

Claims for military personnel concerning prior duty are handled through the Veterans Administration.

There have been a total of 147 claims filed for injury from radiation associated with Naval nuclear propulsion plants. Ninety-seven originated from employees of the six Naval shipyards, thirty-three from private shipyards and seventeen from Navy personnel. These claims are summarized in Table 7. As shown in Table 7 more than half the claims have been filed for injuries other than cancer or leukemia. Three-fourths of the claims filed for cancer or leukemia involved workers with lifetime radiation exposures less than the 5 rem, which is the exposure a nuclear worker is permitted to receive in one year by Federal Regulations.

Six claims have been awarded, two for leukemia in 1968 and 1979, three for cataracts of the eyes in 1971, 1974 and 1977, and one for leukocytosis in 1969. The Navy considers all six of these awards were unjustified:

- One leukemia case had an occupational exposure of 5.38 rem. The claimant had also received hundreds of rem in medical radiation exposure for adenoids. If radiation were to be selected as the cause of this leukemia, then the occupational exposure could not have been more than a tiny part of the total radiation exposure.

- The second leukemia case had a total occupational exposure of 1.00 rem. This amount of radiation exposure is small and less than 10 percent of the amount of exposure the claimant will receive during his life from natural background and medical radiation.
- Two of the cataract cases had total lifetime radiation exposures of about 3 rem, and one case had less than 1 rem. These exposures are hundreds of times smaller than needed to produce cataracts in the eyes.
- The leukocytosis (elevated white blood cell count) case had a total occupational exposure of 15.5 rem which was received over an eight year period. This case was evaluated by the medical research center of a national laboratory, which concluded that the cause of the leukocytosis was unknown. In addition, leukocytosis has not been shown to be associated with low-level occupational radiation exposure.

In addition to the above claims, three suits have been filed in court alleging injury from radiation. One suit involves leukemia; the other two do not involve a cancer. Two have been resolved and the other, which does not involve a cancer, is still in litigation.

From the radiation injury claims filed to date, the Navy has been unable to draw any conclusions concerning radiation injury to personnel occupationally exposed to radiation associated with Naval nuclear propulsion plants.

TABLE 7

CLAIMS FOR RADIATION INJURY TO PERSONNEL

Injury Claimed	Claims Filed	Claims Awarded	Claims Denied or Deferred	Claims Active
Leukemia	23	2	14	7
Cancer Other Than Leukemia	43	0	34	9
Other	81	4	61	16
TOTAL	147	6	109	32

AUDITS AND REVIEWS

Checks and cross-checks, audits, and inspections of numerous kinds have been shown to be essential in maintaining high standards of radiological control. First, each worker is specially trained in radiological control as it relates to his own job. Second, written procedures exist which require verbatim compliance. Third, radiological control technicians and their supervisors oversee radioactive work. Fourth, personnel independent of radiological control technicians are responsible for personnel radiation exposure records.

Fifth, a strong independent audit program is required covering all radiological control requirements. In all shipyards this radiological audit group is independent of the radiological control organization and its findings are reported regularly to senior shipyard management, including the shipyard commander. This group performs continuing surveillance of radioactive work. It conducts in-depth audits of specific areas of radiological control. This group checks all radiological control requirements at least annually.

Sixth, the U. S. Department of Energy assigns to each shipyard a representative who reports to the Director of the Naval Nuclear Propulsion Program at headquarters. One assistant to this representative is assigned full time to audit and review radiological controls, both in nuclear-powered ships and in the shipyard. Seventh, Naval Nuclear Propulsion Program headquarters personnel conduct periodic inspections of radiological control in each shipyard. Similarly, there are multiple levels of audits and inspections for the other Naval shore facilities, tenders, and nuclear-powered ships.

In addition, various aspects of the Naval Nuclear Propulsion Program have been reviewed by other Government agencies. For example, the National Institute for Occupational Safety and Health conducted an evaluation of the radiological controls program at Portsmouth Naval Shipyard in conjunction with its mortality study at the shipyard (discussed earlier in this report). NIOSH published the results of its evaluation in a report (ref 27) in April 1983, which stated the following conclusions (quoted verbatim):

- The employee dose data provided NIOSH by Portsmouth Naval Shipyard is complete and provides a reasonable estimate of the individual worker's dose.
- The Portsmouth Naval Shipyard personnel dosimetry program provides accurate internal and external dose data.
- The external and internal doses received by Portsmouth Naval Shipyard personnel are low compared to present occupational exposure guidelines.

- The probability of unreported accidents/incidents or undocumented exposures is extremely small.
- The radiological controls employed are adequate to protect the worker from internal and external hazards.
- The impact of the nuclear work at Portsmouth Naval Shipyard to the surrounding environment is minimal or negligible.
- Nuclear operations at Portsmouth Naval Shipyard are not contributing a significant radiation dose to the general public.

ABNORMAL OCCURRENCES

It is a fact of human nature that people make mistakes. The key to a good radiological control program is to find the mistakes while they are small and prevent the combinations of mistakes that lead to accidents. The preceding section on inspections supports the contention that more attention is given to errors and their prevention in the Naval Nuclear Propulsion Program than to any other single subject. Requiring constant focus on improving performance of radiological work has proven effective in reducing errors.

In addition, radiological control technicians are authorized and required to stop anyone performing work in a manner which could lead to radiological deficiencies. A deficiency, of course, is a failure to follow a written procedure verbatim. However, the broadest interpretation of the term "deficiency" is used in the Navy's radiological control program. Anything involved with radiation or radioactivity which could have been done better is also a radiological deficiency.

Radiological deficiencies receive management attention. But there is a higher level of deficiency that is defined as a radiological incident. Incidents attract a great deal of notice, including the personal attention of the Director of the Naval Nuclear Propulsion Program at headquarters. Improvement programs over the years have constantly aimed at reducing the numbers of radiological incidents. As improvements occurred, the definition of what constituted an incident was changed to define smaller deficiencies as incidents. These changes were necessary so that the incident reporting system would continue to play a key role in upgrading radiological controls. As a result, it is not practicable to measure performance merely by counting numbers of radiological incidents or deficiencies.

There is a reporting system that has been nearly constant over time and therefore can be used as a basis for comparison. The Department of Energy and its predecessors have used these levels of severity to define radiological occurrences (ref 28). Examples of radiation exposure incidents in each type follow:

- Type A - external radiation exposure over 25 rem in one incident

- Type B - external radiation exposure over 5 rem in one incident

- Type C - external whole body radiation exposure over 3 rem in one quarter year

The Nuclear Regulatory Commission also has criteria defining abnormal occurrences. The Navy regularly evaluates radiological events using these criteria for comparison; results are reported in Table 8.

TABLE 8

ABNORMAL OCCURRENCES IN THE NAVAL NUCLEAR PROPULSION PROGRAM

Year	Number of Abnormal Occurrences*
1975	0
1976	0
1977	0
1978	0
1979	0
1980	0
1981	0
1982	0
1983	0

*Abnormal occurrences are reported here if the Navy evaluation determines they meet either the Department of Energy criteria for Type A radiation exposure incidents or the Nuclear Regulatory Commission criteria for quarterly report to Congress as abnormal radiation exposure occurrences.

The policy of the Navy is to provide for close cooperation and effective communication with state radiological officials involving occurrences that might cause concern because of radiological effects associated with the ships or shore facilities. The Navy has reviewed radiological matters with state radiological officials in the states where Naval nuclear-powered ships are based or overhauled. Although there were no recent occurrences which resulted in radiological effects to the public outside these facilities or which resulted in radiological injury to residents of the states working inside these facilities, states were notified when inquiries showed public interest in the possibility such events had occurred.

REFERENCES

(1) National Council on Radiation Protection and Measurements Report 17, "Permissible Dose from External Sources of Ionizing Radiation," including April 15, 1958 Addendum "Maximum Permissible Radiation Exposures to Man" (originally published in 1954 as National Bureau of Standards Handbook 59)

(2) International Commission on Radiological Protection Publication 1, "Recommendations of the International Commission on Radiological Protection" (Adopted September 9, 1958), Pergamon Press 1959

(3) Code of Federal Regulations Title 10 (Energy) Part 20, "Standards for Protection Against Radiation"

(4) Federal Radiation Council, "Radiation Protection Guidance for Federal Agencies," approved by President Eisenhower May 13, 1960, printed in Federal Register May 18, 1960

(5) International Commission on Radiological Protection Publication 9, "Recommendations of the International Commission on Radiological Protection" (Adopted September 17, 1965), Pergamon Press, 1966

(6) National Council on Radiation Protection and Measurements Report 39, "Basic Radiation Protection Criteria," January 15, 1971

(7) Department of Energy Order 5480.1, Chapter XI, "Requirements for Radiation Protection"

(8) International Commission on Radiological Protection Report 26, "Recommendations of the International Commission on Radiological Protection" (Adopted January 17, 1977), Pergamon Press 1977

(9) Environmental Protection Agency, "Federal Radiation Protection Guidance for Occupational Exposures; Proposed Recommendations, Request for Written Comment and Public Hearing," Federal Register, Vol. 46, No. 15, January 23, 1981

(10) Department of the Navy, Naval Medical Command, "Radiation Health Protection Manual," (NAVMED P-5055)

(11) U. S. Nuclear Regulatory Commission, "Occupational Radiation Exposures at Commercial Nuclear Power Reactors - 1982," NUREG-0713, Volume 4, December 1983.

(12) U.S. Navy Report, "Environmental Monitoring and Disposal of Radioactive Wastes from U.S. Naval Nuclear-Powered Ships and their Support Facilities - 1983," C. H. Schmitt, J. J. Mangeno, and J. M. Steele, NT-84-1, February 1984.

(13) International Commission on Radiological Protection Report 10, "Evaluation of Radiation Doses to Body Tissues from Internal Contamination Due to Occupational Exposure," Pergamon Press 1968

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(17) U. S. Department of Health and Human Services-National Institute for Occupational Safety and Health, "Epidemiologic Study of Civilian Employees at the Portsmouth Naval Shipyard," December 1980

(18) United Nations Scientific Committee on the Effects of Atomic Radiation, "Ionizing Radiation: Levels and Effects," 1972

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(20) Interagency Task Force on the Health Effects of Ionizing Radiation, June 1979

(21) Environmental Protection Agency, "Estimates of Ionizing Radiation Doses in the United States 1960 - 2000," ORP/CSD 72-1 August 1972

(22) National Council on Radiation Protection and Measurements Report 56, "Radiation Exposure from Consumer Products and Miscellaneous Sources," November 1, 1977

(23) U. S. Nuclear Regulatory Commission, "Final Environmental Statement on the Transportation of Radioactive Materials by Air and Other Modes," NUREG-0170, December 1977

(24) National Cancer Institute, "The Smoking Digest" October 1977

(25) National Safety Council, "Accident Facts-1977 Edition"

(26) U. S. Nuclear Regulatory Commission, "Health Effects Attributable to Coal and Nuclear Fuel Alternatives," NUREG-0332 Draft September 1977

(27) National Institute for Occupational Safety and Health Report, "The Radiological Control Program of the Portsmouth Naval Shipyard," W. E. Murray & M. S. Terpilak, April 1983

(28) Department of Energy Order 5484.1, "Environmental Protection, Safety, and Health Information Reporting Requirements"

CLOSING REMARKS

Senator Warner. Before we adjourn, Admiral, is there anything further you wish to bring to us?

Admiral McKee. No, sir.

Senator Warner. This has been a very enjoyable session, Admiral. It is always a pleasure to have you before us.

I must ask the staff to take a good look at this. We have a responsibilty to look at all aspects of our spending programs this year.

Nice to see you again.

We will adjourn for 4 or 5 minutes.

[Whereupon, at 10:15 a.m., the subcommittee proceeded to other business.]

DEPARTMENT OF DEFENSE AUTHORIZATION FOR APPROPRIATIONS FOR FISCAL YEAR 1985

FRIDAY, MAY 4, 1984

U.S. SENATE,
SUBCOMMITTEE ON STRATEGIC AND
THEATER NUCLEAR FORCES,
COMMITTEE ON ARMED SERVICES,
Washington, DC.

CIVIL DEFENSE PROGRAM

The subcommittee met in open session, pursuant to other business, at 10:32 a.m., in room SR-222, Russell Senate Office Building, Senator John W. Warner (chairman) presiding.

Present: Senator John W. Warner.

Staff present: Robert F. Bott, William E. Hoehn, Jr., professional staff members; Douglas R. Graham, research assistant; and Karen A. Love, staff assistant.

Also present: Les Brownlee, assistant to Senator Warner; and Jeffrey B. Subko, assistant to Senator Exon.

OPENING STATEMENT BY SENATOR JOHN W. WARNER, CHAIRMAN

Senator WARNER. The subcommittee reconvenes in open session to receive testimony regarding the civil defense program, in review of S. 2414, the fiscal year 1985 Defense authorization bill.

We welcome our witnesses this morning. We will hear first from Hon. Louis O. Giuffrida, Director, Federal Emergency Management Agency, and then Gen. Richard Stilwell, Deputy Under Secretary of Defense for Policy.

Gentlemen, I appreciate your appearance this morning.

I apologize for earlier engagements before this subcommittee which were prolonged. We will provide you as much time as you desire.

STATEMENT OF HON. LOUIS O. GIUFFRIDA, DIRECTOR, FEDERAL EMERGENCY MANAGEMENT AGENCY

Mr. GIUFFRIDA. Thank you, Mr. Chairman.

I appreciate appearing before you today to review the President's fiscal year 1985 request for civil defense.

You have correctly identified General Stilwell, Deputy Under Secretary of Defense for Policy, who is with us today in support of the fiscal year 1985 civil defense request.

Mr. Chairman, in order that the Federal Emergency Management Agency can fulfill the statutory mandates placed upon it by the Congress, it is essential that the full $252.478 million requested by the President be approved for 1985.

CONGRESSIONAL CIVIL DEFENSE POLICY

The basic purpose of government is to protect the lives of its citizens. Everything else springs from this immutable and fundamental responsibility. May I quote from the declaration of policy set forth by the Congress in the Civil Defense Act, as amended, in 1981:

> It is the policy and intent of Congress to provide a system of civil defense for the protection of life and property in the United States from attack and from natural disasters. It is further declared to be the policy and intent of the Congress that the responsibility for civil defense shall be vested jointly in the Federal Government and the several States and their political subdivisions. . . .

The mandate of Congress to the President—which he has delegated to FEMA—is to work in partnership with State and local governments to help preserve life and property and to provide protection from all major disasters.

Preservation of life is an inherent humanitarian responsibility of government to its people. The FEMA mission is to help save lives. We do this by helping State governments and local communities to do their job of saving lives.

INTEGRATED EMERGENCY MANAGEMENT SYSTEM

Last year we outlined the method by which we are working with State and local governments, the integrated emergency management system, or IEMS. This is based upon the fact that the functions called for in the Civil Defense Act are basically common functions required in all emergency situations to protect our citizens. IEMS is a "grass-roots-up" approach, and it builds on the foundation of existing emergency plans and systems.

In fiscal year 1984 we are now beginning to implement integrated emergency management, including field testing. Fiscal year 1985 will see its intensification and broad deployment.

This intensified emphasis on IEMS reflects the strong recommendation of 100 Federal, State and local professionals who participated last summer in a reassessment of the civil defense program.

We are applying the integrated approach within FEMA, and in fact, on an interagency basis in the Federal Government, as well as in our programs with State and local governments.

In other words, we are practicing at the Federal level what we preach about integrated emergency management for all levels of government. Examples of such IEMS activities include, among many others.

Operation of a 24-hour, state-of-the-art emergency information and coordination center [EICC] at the FEMA headquarters building in Washington, linked to the White House situation room, national warning networks, the Defense Department, other Federal agencies, the FEMA regions, and the States.

Training in emergency management for elected and appointed officials at all levels of government—as well as tests and exercises in which all levels prepare for coordinated operations in emergencies of all types.

FEMA was established—by executive branch and congressional action—to develop a truly comprehensive national system for emergency management.

Integrated emergency management is of special significance in the civil defense program because this program accounts for the preponderance of the Federal Government's support for State and local emergency management personnel and programs.

SUBSTANTIVE CHANGES IN CIVIL DEFENSE PROGRAM

Also, integrated emergency management as applied in the civil defense program involves important substantive changes. The substantive changes we are making right now, in fiscal year 1984, and will be intensifying in fiscal year 1985, include the following—all aimed at saving lives in emergencies of all types.

Local emergency plans will address all hazards likely to affect the people of each locality, based on a hazard analysis for that community.

FEMA helps local and State governments to develop multiple hazard emergency plans by funding professional planners at the State level.

In fiscal year 1983 and before, these were termed nuclear civil protection planners and they devoted nearly all of their time to developing plans for the contingency of enemy attack.

Starting in fiscal year 1984, they have been designated as population protection planners and they are helping local governments to develop plans for all likely hazards.

Where relocation plans were developed in 1976 through 1983, these will be refocused to address evacuation from all hazards likely to affect a specific community.

There are some 1,480 localities who have completed relocation plans, almost half of the 3,135 local jurisdictions needing such plans.

Similarly, starting in fiscal year 1984, the State radiological defense officers [RDO's] funded by FEMA are expanding their activities to address plans and capabilities for response to all emergencies involving radioactive materials—such as transportation accidents or accidents at nuclear powerplants.

This multiple-hazard approach is also being reflected in our radiological instrumentation effort.

The shelter survey, hitherto attack-oriented, is likewise being broadened to identify protection against tornadoes, hurricanes, and other threats—again a substantive change.

As an aside, I would point out this year we have already had 100 people who have lost their lives in tornadoes.

We have made these changes because they are in line with the mandates set forth by the Congress, especially in 1980 and 1981 amendments of the Civil Defense Act, and with Presidential directives as well.

We have made them because they are in keeping with the basic thrust and intent of the Congress and of the executive branch when FEMA was established in 1979.

And we have made them because they are sound on a number of commonsense grounds including economy; multiple-use of scarce tax dollars; and increasing the effectiveness of local and State governments in dealing with emergencies of all types.

Recently, the mayor of Miami, the Honorable Maurice Ferre, signed a proclamation commending FEMA for establishing IEMS as an all-hazards, intergovernmental strategy and pledging Miami's participation in its implementation.

We have found positive, in fact enthusiastic, reception from Miami to the Pacific Northwest, and anticipate that this will grow.

EXPERIENCE WITH INTEGRATED PREPAREDNESS

Actual experience has shown that integrated plans work when an emergency strikes. For example, at 4 a.m. on Easter Sunday, 1983, a 20,000-gallon tank car filled with nitric acid was crushed in a switching accident and threatened a large part of Denver with a cloud of toxic vapor.

In a textbook operation, the people were alerted by radio-activated sirens and were given evacuation instructions by local officials, over local stations of the emergency broadcast system.

Some 9,000 people were evacuated from a 4-square-mile area. The effort was directed from Denver's emergency operating center, with the mayor at the helm throughout.

The plans, the warning sirens, the emergency operating center, communications, and other systems and capabilities used at Denver were developed through the civil defense program.

The Denver emergency is one of the largest-scale evacuations ever required by a hazardous materials spill in the United States.

However, several years ago about a quarter million people had to evacuate due to a chlorine accident near Toronto.

I have with me a copy of a letter from the mayor of Denver—the Honorable Federico Pena—which I would be glad to provide for the subcommittee's record.

Mayor Pena says that the warning system, emergency operating center, and other assets provided by the civil defense program have contributed significantly to Denver's ability to respond effectively to a variety of emergencies.

[The letter follows:]

CITY AND COUNTY OF DENVER,
Denver, CO, February 24, 1984.

Hon. LOUIS A. GIUFFRIDA,
Director, Federal Emergency Management Agency,
Washington, DC.

DEAR MR. GIUFFRIDA: While I was not Mayor during the Easter Sunday, 1983, Nitric Acid Spill, I was a very concerned citizen living just outside the evacuation area. The products of many federally subsidized emergency management programs were utilized in this life threatening disaster that required the evacuation of 9,000 citizens from a four square mile area.

These programs included Denver's outdoor warning system, emergency communications, emergency operations center, and emergency management training through the National Emergency Training Center. Denver's capability to deal with extreme emergencies is due in part to such federal assistance and guidance.

Denver is following the all hazard emergency planning approach promulgated by the Federal Emergency Management Agency. We have found this to be an extremely successful approach as evidenced by that hazardous materials incident response and handling of the severe winter storm this past November. I personally was involved in overseeing the latter city-wide response from the Emergency Operations Center. It went smoothly and I was in contact with all city agencies from the Emergency Operations Center.

Based on my observations, it is evidence that the programs of the Federal Emergency Management Agency have contributed significantly to our ability to respond effectively and efficiently to a variety of natural and technological emergencies.

Sincerely yours,

FEDERICO PENA, *Mayor.*

Mr. GIUFFRIDA. I described other emergencies to the subcommittee last year which also illustrate the validity of integrated multiple-hazard plans—for example, the December 1982 emergency at Taft, LA.

When there was a threat of explosion at a chemical plant, and the release of toxic substances, some 17,000 people were evacuated from the area in 2½ hours—using evacuation plans prepared for the possibility of an accident at the nearby Waterford nuclear powerplant, not the chemical plant.

Also, a civil defense relocation plan was used to evacuate 25,000 people in Brunswick, GA, when a hurricane threatened.

There will undoubtedly be success stories in the future as there have been in the past, when Denver and other communities conducted well-synchronized operations when confronted with an emergency.

But for every Denver, with good readiness to protect its people, there are many communities that fall far short. They lack the emergency facilities and communications, the training for key officials, and the professional emergency staff needed to protect their people adequately when disaster strikes.

NEED FOR ATTACK PREPAREDNESS

I know that you will not construe my discussion on domestic emergencies to mean that integrated emergency management addresses only those contingencies.

Fortunately, for more than a century this country has not experienced hostilities on its soil. But the full spectrum of emergencies legally mandated by the act also includes what we all hope we shall never see, the possibility of enemy attack on the United States.

I am well aware that there is little dispute over the peacetime humanitarian benefits of the civil defense program, but that some are opposed to any attempt to save lives in the event of attack.

This is a view, however, which is not open to FEMA or the Federal Government given the clear mandate set forth by the Congress in the Civil Defense Act:

> * * * to provide a system of civil defense for the protection of life and property in the United States from attack and from natural disasters.

It is a view which is not in accord with the opinion of a majority of the American people, as shown by a succession of opinion surveys.

Gallup polls in 1982 showed about 60 percent of the people would disapprove ending the civil defense program versus 18 percent who would approve. Also, 67 percent approved of having evacuation plans, and about two-thirds said they would move if advised to do so.

In fact, half said they would move on their own, without official advice. And it is a view which overlooks the highest—and humanitarian—obligation of any government, to protect its people, especially in the context of national security.

ACTION BY GOVERNOR OF STATE OF WASHINGTON

Mr. Chairman, you may be interested in a recent sequence of events in the State of Washington bearing on this obligation of government to protect its people. Both houses of the State legislature approved language, in an authorization bill, opposed to any type of planning to deal with the effects of nuclear attack.

This reflected, of course, the view of those who believe it improper to attempt to save lives should a nuclear conflict ever occur.

The Governor of Washington, the Honorable John Spellman, was of the opposite view—and the laws of Washington provide for a line item veto.

On February 23, 1984, Governor Spellman vetoed the language opposing attack preparedness. The Governor, in his veto message to the senate, stated:

> The State of Washington is responsible for the protection of the lives and property of its citizens. This responsibility is expressed in our state and national constitutions and outlined in State and Federal laws.
>
> Although a nuclear attack would be a nightmare, one which would make all other calamities man has suffered seem small, State government is obligated to save as many lives as possible, and it is immoral to prevent government from doing all that it can to save lives and reduce suffering.
>
> The section which I am vetoing would shackle the hands of State agencies in responding to the massive human suffering following an attack. Although there may be little that government can do, it cannot stand by and watch citizens suffer if there are State resources that can be used to provide them some relief.
>
> Although possible scenarios for a nuclear war can be debated, the fact remains that no one can guarantee that our entire population will be lost in an attack. As long as any of our citizens remain alive, they are entitled to the protection and services of the State.
>
> If at all possible, food, water, relief from pain, and shelter must be provided to those in need.

SPONTANEOUS EVACUATION

Quite apart from debates about whether it is or is not humanitarian to try to save lives, there is the fact that if people perceive a threat to their lives or safety, they will move to an area they consider to be safer.

We saw that at Three Mile Island, where 145,000 people left the area without any official advice to do so. Should an acute international crisis ever occur, public opinion polls indicate that people are going to leave U.S. cities by the millions.

The only choice is, do we have some plans and preparations or do we not have plans and preparations?

The certainty of spontaneous movement is a strong argument for developing evacuation plans and capabilities, particularly when evacuation clearly will save lives in a variety of domestic disasters and hazards.

President Kennedy termed civil defense preparations as "insurance we trust will never be needed—but insurance which we could never forgive ourselves for foregoing in the event of catastrophe."

The insurance rationale applies to domestic and national security emergencies alike.

This year we are spending for this insurance against disasters and emergencies, identified by President Kennedy, about 75 cents for each man, woman, and child in this country. That is about one-fifth of a cent per day, or 1 penny every 5 days.

I need not point out how little fire, automobile, or health insurance 75 cents will provide. In civil defense, it provides an organization, but only marginal capabilities to protect life in major emergencies.

NEED TO IMPROVE TRAINING

I would like to stress, in closing, the special need for more and better emergency management training for responsible officials throughout the country, and the need to modernize our antiquated Federal communications and warning systems.

The need for training in emergency management was highlighted in a 1983 conference of elected officials at which my staff distributed a questionnaire dealing with emergency management basics.

The questionnaire asked whether respondents knew the answers to such policy questions as who has authority to use schools as shelters in a local emergency? Who can declare such an emergency, and what authority does this confer?

I am grieved to say that the majority did not know the answers to questions which frequently arise in emergencies. There is a crying need to reach policy level local officials with training in these and related areas, and our fiscal year 1984 request will permit us to meet this need—in particular with our emergency management curriculum, providing scenario-based exercise courses which simulate a high-stress emergency environment.

We know we can do this job, and do it well—given the necessary resources—because we have already given training to the chief executives and key officials of selected jurisdictions. These have included Arlington County and the city of Alexandria, in Virginia; Atlanta/Fulton County, GA; and three counties in Tennessee.

In March Mayor Tom Bradley of Los Angeles, with 8 of his department heads and 56 of their deputy assistants, participated in a course at our Emergency Management Institute at Emmitsburg, MD—culminating in an exercise based on a number of simulated emergencies affecting the Los Angeles area.

Also in March we put on a similar course onsite at New Orleans to help them plan for emergencies which might occur during the World's Fair.

This month we will be training Fort Worth officials at our Emmitsburg facility and providing onsite training for officials at San Francisco and Dallas.

The elected and appointed officials who have participated in this type of exercise-based training have all told us that it improves their ability to respond effectively when real emergencies occur.

I hope that congressional action on our fiscal year 1985 request will allow us to meet the strong and growing demand for training of this type throughout the United States—both in courses at Emmitsburg and, increasingly, onsite at local jurisdictions.

NEED FOR MODERN COMMUNICATIONS AND WARNING

The situation regarding telecommunications and warning is also critical. Radio communications, for example, between the States and FEMA regional offices rely on 1950's vintage equipment.

The existing Federal warning system depends almost completely on leased AT&T lines. It is outdated and vulnerable, and costs may be subject to substantial increases due to divestiture.

Our fiscal year 1985 request will provide for development of the national emergency management system [NEMS], integrating FEMA telecommunications, warning and information systems.

Briefly, NEMS is to the civilian side of Government what the national military command system is to the military side.

We will complete the replacement of mid-1950's radio equipment at the FEMA regions and all States; start deployment of a modern low-frequency radio and meteor burst radio warning system—including capabilities to activate warning receivers in, for example, an area threatened by tornadoes or flash floods; and make associated improvements to FEMA civil networks.

We have just had an experience illustrating vividly why it is imperative that we move as quickly as possible to the maximum use of radio communications and away from leased land lines.

Recently, we were required to move a call director telephone from one location to another at our National Warning Center at NORAD Headquarters in Cheyenne Mountain. The charge for this kind of routine job used to be about $100. You can imagine our shock when we found that the bill for this job—following AT&T divestiture—had risen to over $2,100 to move the one telephone.

SUMMARY

In conclusion, I believe that FEMA's fiscal year 1985 request for $252.478 million should be approved. Humanitarian concern for human life, Presidential directives, and the intent of the Congress expressed in the Civil Defense Act, including its recent amendments, all dictate that we provide improved capabilities to save lives in all emergencies.

On February 27, Senator Thurmond gave an address to the National Organization of City and County Emergency Preparedness Directors, asking what reason there might be for what appeared to be a conscious decision not to defend our people. He asked:

> What other major power in history has arrived at such a peculiar and unusual decision?
>
> Why in the United States, of all countries, with our two centuries of commitment to the rights of the individual, do we ignore the most fundamental right of all, the right to expect modest preparedness on the part of Government to protect the very life of the individual?

Mr. Chairman, I would be pleased to respond to any questions you may have.

[The statement of Mr. Giuffrida follows:]

PREPARED STATEMENT BY HON. LOUIS O. GIUFFRIDA, DIRECTOR, FEDERAL EMERGENCY MANAGEMENT AGENCY

Mr. Chairman, I appreciate appearing before you today to review the President's fiscal year 1985 request of $252.478 million for programs authorized under the Federal Civil Defense Act.

General Richard Stilwell, Deputy Under Secretary of Defense for Policy, is also appearing today in support of the fiscal year 1985 civil defense request.

Mr. Chairman, in order that the Federal Emergency Management Agency can fulfill the statutory mandates placed upon it by the Congress, it is essential that the full $252.5 million requested by the President be approved for 1985. These mandates are set forth in the Civil Defense Act as enacted in 1951 and in the 1980 and 1981 amendments, in particular.

The basic purpose of government is to protect the lives of its citizens. Everything else springs from this immutable and fundamental responsibility. Citizens have an inherent right to protection against life-threatening hazards they may face, irrespective of nature or cause.

May I quote from the declaration of policy set forth by the Congress in the Civil Defense Act, as amended in 1981:

"It is the policy and intent of Congress to provide a system of civil defense for the protection of life and property in the United States from attack and from natural disasters. It is further declared to be the policy and intent of the Congress that the responsibility for civil defense shall be vested jointly in the Federal Government and the several States and their political subdivisions * * *."

The mandate of Congress to the President—which he has delegated to FEMA— is to work in partnership with State and local governments to help preserve life and property and to provide protection from all major disasters.

Natural disasters strike many communities and States each year. In 1983, there were 21 disasters which were declared by the President to be major disasters. These involved a total Federal obligation of some $1.1 billion. The most extensive disaster occurred in February, when severe storms in California produced flooding and mud slides. This was followed by the Coalinga earthquake in May, flooding along the Colorado river in July, and flash floods in September—all in California.

There were severe storms, flooding, and tornadoes in Mississippi in April, as well as landslides and floods in Utah, and flooding in Lousiana. In August, the Galveston and Houston areas in Texas were hit by Hurricane Alicia.

Our responsibility for helping to preserve life is not limited to natural disasters. It also includes manmade disasters such as oil and chemical spills and other technological emergencies. Some of these may involve radioactive materials, such as transportation accidents or emergencies affecting a nuclear power plant. And, of course, one of our major responsibilities under the Act is to provide for protection from the effects of enemy attack.

Preservation of life is an inherent humanitarian responsibility of government to its people. The FEMA mission, as set forth in the declaration of policy in the Act, is to help save lives.

How do we help? We help State governments and local communities to do their job of saving lives. Most of the civil defense funding is spent at the State and local community level. State and local leaders working with emergency services directors prepare the plans that allow the community to respond to emergencies as they occur. These plans embody the basic functions that are necessary for effective emergency action—warning, communications, direction of operations by key local and State officials, evacuation, provision of shelter and care, provision of medical supples, provision of food and water. All these elements are essential to preparing for disaster of any kind. The planning is done by people in communities at the State and local level where there are close ties with the police and fire services and emergency response organizations such as the American Red Cross and other voluntary agencies.

These and related elements of the civil defense program were specified in Title V of the Act, added by the Congress in 1980. They are included in our fiscal year 1985 request.

Last year we outlined the method by which we are working with State and local governments, the Integrated Emergency Management System, or IEMS. This is based upon the fact that the functions called for in the Civil Defense Act are basically common functions required in all emergency situations to protect our citizens. IEMS fosters a full Federal, State, and local government partnership, with provisions for flexibility at the several levels of government for achieving common readiness goals. It is a "grass-roots-up" approach, and it builds on the foundation of existing emergency plans and systems.

In fiscal year 1984 we are beginning to implement integrated emergency management, including field testing. Fiscal year 1985 will see its intensification and broad deployment. This intensified emphasis on IEMS reflects the strong recommendation of the 100 Federal, State, and local emergency management professionals who participated last summer in a review and reassessment of the civil defense program.

We are applying the integrated approach within FEMA, and in fact on an interagency basis in the Federal Government, as well as in our programs with State and local governments. In other words, we are practicing at the Federal level what we preach about integrated emergency management for all levels of government. Examples of such IEMS activities include, among many others:

Operation of a 24-hour, state-of-the-art Emergency Information and Coordination Center (EICC) at the FEMA Headquarters building in Washington, linked to the White House Situation Room, National Warning networks, the Defense Department, other Federal agencies, the FEMA Regions, and the States. The EICC provides a means through which government leaders may coordinate national support to any major emergency threatening a broad segment of Americans.

Development of an integrated system of emergency telecommunications, warning, ADP, and information for use by civil government from the Washington level to and through the States.

Training in emergency management for elected and appointed officials at all levels of government.

Tests and exercises in which all levels of government prepare for coordinated, integrated operations in domestic and national security emergencies of all types.

Issuance of preparedness guidance to Federal agencies on actions to mobilize personnel and resources to manage the full spectrum of domestic and national security emergencies.

Indeed, FEMA was established—by executive branch and congressional action—to foster the development of a truly comprehensive national system for emergency management and to provide useful infrastructure at Federal, State and local levels and in the private sector to plan for, mitigate, and respond to emergencies of all types. Integrated emergency management is of special significance in the civil defense program because it is this program which accounts for the preponderance of the Federal Government's support for State and local emergency management personnel as well as for the programs which improve their ability to save lives where the people are—in local jurisdictions throughout the United States.

Also, integrated emergency management as applied in the civil defense program involves important substantive changes. The substantive changes we are making right now, in fiscal year 1984, and will be intensifying in fiscal year 1985, include the following—all aimed at saving lives in emergencies of all types:

We have put four basic pieces of IEMS guidance in the hands of State and local governments. The first provides an overview of the IEMS process; the second describes how to make a hazard analysis for each community; the third specifies standards and a method to assess capabilities; and the fourth covers multi-year program development planning. We hear back from Texas and elsewhere that this approach is widely accepted by local governments because it is logical and makes sense to them.

Local emergency plans will address all hazards likely to affect the people of each locality, based on a hazard analysis for that community. Some hazards give enough warning of their onset that there is usually time for people to leave the threatened area and go to a safer place. Evacuation is thus usually the best tactic for hazards such as a hurricane, a flood, the release or threatened release of a toxic substance such as chlorine, a nuclear power plant accident, a possible terrorist threat, or an acute international crisis. Other threats arise suddenly—such as a tornado or earthquake—and people must therefore be protected in-place, at or near their homes, schools, or places of work. Time ordinarily does not permit leaving the threatened area.

New model emergency plans—starting this year, fiscal year 1984—address all hazards and they emphasize the functions needed to save lives from these hazards, either by evacuation or protecting people in-place. These functions include, for example, warning the people; advising them of the specifics of "where to go and what to do" for protection, usually through local news media; providing for direction of lifesaving operations by key officials of local or State government; and providing for fire protection, for traffic direction as needed, and for various kinds of life-support such as sheltering and feeding.

FEMA helps local and State governments to develop these multiple-hazard emergency plans by funding professional planners at the State level. In fiscal year 1983 and before these were termed Nuclear Civil Protection planners and they devoted nearly all their time to developing plans for the contingency of enemy attack.

Starting in fiscal year 1984, they have been designated as Population Protection Planners and they are helping local governemnts to develop plans for all likely hazards. Where relocation plans were developed in 1976 through 1983, these will be refocused to address evacuation from all hazards likely to affect specific community. (Some 1,480 localities have completed relocation plans, almost half of the 3,135 local jurisdictions needing such plans.) In general, all current single-purpose emergency plans—whether for hurricanes, earthquakes, flood, or enemy attack—will be integrated into full-spectrum plans.

Similarly, starting in fiscal year 1984 the State Radiological Defense Officers (RDO's) funded by FEMA are expanding their activities to address plans and capabilities for response to all emergencies involving radioactive materials—such as transportation accidents or accidents at nuclear power plants. This multiple-hazard approach is also being reflected in our Radiological Instrumentation effort. These are changes in substance from fiscal year 1983 and before, when nearly all State RDO time was devoted to preparing for attack-caused radiological hazards.

The shelter survey, hitherto attack-oriented, is likewise being broadened to identify protection against tornadoes, hurricanes, and other threats—again a substantive change. The surveys conducted from the mid-1970's through 1983 have, however, generated data with substantial multiple-hazard use. The surveys have identified thousands of buildings that can be used for temporary lodging of people forced to leave their homes by various types of disasters. If a catastrophic earthquake hit the Los Angeles or San Francisco Bay areas, there would be damaged housing and damage to utilities, probably including fallen high voltage lines, disrupted telephone service, and fallen highway bridges and overpasses. It would likely be necessary to provide temporary lodging and other care for many thousands of people for a considerable period after the earthquake, until utilities and other life-support systems could be restored.

The temporary lodging facilities identified by previous shelter surveys could be used by people evacuated from damaged areas after an earthquake. Such care for evacuees is of course an integral part of multi-hazard emergency planning.

These examples show how FEMA has made substantive changes in its programs to assure that essentially all effort will save lives in emergencies of all types. We have made these changes because they are in line with the mandates set forth by the Congress, especially in 1980 and 1981 amendments of the Civil Defense Act, and with Presidential directives as well. We have made them because they are in keeping with the basic thrust and intent of the Congress and of the executive branch when FEMA was established in 1979. And we have made them because they are sound on a number of common-sense grounds including economy; multiple-use of scarce tax dollars; and increasing the effectiveness of local and State governments in dealing with emergencies of all types, including those emergencies which threaten the lives of some of our people, in some jurisdictions, nearly every week.

As I said previously, the intensification of integrated emergency management was strongly recommended by Federal, State and local professionals who participated in a review and reassessment of the civil defense program last summer. Early indications are that integrated planning is finding favor with local government officials as well.

The State of Massachusetts is one of the leaders in multiple-hazard emergency planning, stressing the functions needed to save lives in disasters of all types. Over 100 of the 350 cities and towns in that State now have such integrated, multiple-hazard plans—developed with assistance on-site by the State planning staff funded by FEMA. During FY 1984, the State's planners hope to complete hazard analyses for all localities within Massachusetts—providing a basis for locally-tailored, hazard-specific plans for the remaining localities within the State.

We have heard from the North West, Texas, and other parts of the country that multiple-hazard planning is well received by the elected officials of State and local governments. There is also multi-jurisdiction planning going on—for example, tri-State hurricane evacuation planning in Alabama, Florida, and Georgia, and planning by a nine-parish association in Greater New Orleans to develop a regional approach to emergency readiness.

Recently, the Mayor of Miami, the Honorable Maurice Ferre, signed a proclamation which commended FEMA for, ". . . its comprehensive emergency management strategy to prevent . . . loss of life and property . . . for its establishment of the National Advisory Committee representing all types of emergency management officials to examine the problems of local emergency management officials . . . for the establishment of the Intergrated Emergency Management System as an all-hazard . . . intergovernmental strategy, employing both public and private sector resources. . . ." The City, in its proclamation, also strongly supports the national commitment to IEMS. It will participate in its development and encourage individuals to become involved in its implementation.

Actual experience has shown that integrated plans work when an emergency strikes. For example, at 4:00 a.m. on Easter Sunday, 1983, a 20,000 gallon tank-car containing nitric acid was crushed in a switching accident, and a large part of Denver was threatened by a cloud of toxic vapor. In a textbook operation, the people were alerted by radio-activated sirens and were given evacuation instructions by local officials, over local stations of the Emergency Broadcast System. Some 9,000 people were evacuated from a 4 square-mile area. The effort was directed from Denver's Emergency Operating Center, with the Mayor at the helm throughout. The plans, the warning sirens, the Emergency Operating Center, communications, and other systems and capabilities used at Denver were developed through the civil defense program.

In Texas, the Mayor of the coastal town of Hitchcock attended a hurricane preparedness workshop in June 1983. She later told the Governor that without that training she would have been lost when Hurricane Alicia struck in August.

I described other emergencies to the Subcommittee last year which also illustrated the validity of integrated multiple-plans—for example, the December 1982 emergency at Taft, Louisiana. When there was a threat of explosion at a chemical plant, and the release of toxic substances, some 17,000 people were evacuated from the area in 2½ hours—using evacuation plans prepared for the possibliity of an accident at the nearby Waterford nuclear power plant, not the chemical plant. Also, a civil defense relocation plan was used to evaucate 25,000 people in Brunswick, Georgia, when a hurricane threatened.

The point is that preparedness for emergencies is just that—preparedness for any emergency which may threaten life and the public safety. Evacuation is a tactic which on occasion must be used and is used to save lives—more often than many of us may realize. Records indicate that since 1951, nearly 3 million people have been evacuated from over 220 different places when they were threatened by floods, hurricanes, fires, and accidents. A number of these threats required evacuating over a quarter-million people.

In these and a multitude of other emergencies, emergency facilities and resources provided through civil defense are routinely used to save lives. The National Warning System is used to warn localities of severe weather threats, and local civil defense siren systems are used to alert people about approaching tornadoes.

Local officials direct lifesaving operations from the community's Emergency Operating Center, while emergency instructions are transmitted to the public using stations of the Emergency Broadcast System. Radiological instruments and training personnel provide support in road accidents or other emergencies involving radioactive materials. Without these capabilities supported by the civil defense program, communities would find it much more difficult to deal with local emergencies.

There will undoubtedly be success stories in the future as there have been in the past, when Denver and other communities have conducted well-synchronized operations when confronted with an emergency. But for every Denver, with good readiness to protect its people, there are many communities that fall far short. They lack the emergency facilities and communications, the training for key officials, and the professional emergency staff needed to protect their people adequately when disaster strikes.

I know that you will not construe my discussion of domestic emergencies to mean that integrated emergency management addresses only those contingencies. Happily, for more than a century this country has not experienced hostilities on its soil. But the full spectrum of emergencies also include what we all hope we shall never see, the possibility of enemy attack.

I am well aware that there is little dispute over the peacetime humanitarian benefits of the civil defense program but that some are opposed to any attempt to save lives in the event of attack. That is a view, however, which is not open to FEMA or the Federal Government given the clear mandate set forth by the Congress in the Civil Defense Act: " . . . to provide a system of civil defense and from natural disasters." It is the view which is not in accord with the opinion of a majority of the American people, as shown by a succession of opinion surveys. (Gallup polls in 1982 showed about 60 percent of the people would disapprove ending the civil defense program versus 18 percent who would approve; also, 67 percent approved of having evacuation plans, and about two-thirds said they would move if advised to do so—in fact, half said they would move on their own, without official advice.) And it is a view which overlooks the highest—and humanitarian—obligation of any government, to protect its people, especially in the context of national security.

Mr. Chairman, you may be interested in a recent sequence of events in the State of Washington bearing on this obligation of government to protect its people. Both houses of the state legislature approved language, in an authorization bill, opposed to any type of planning to deal with the effects of nuclear attack. This reflected, of course, the view of those who believe it improper to attempt to save lives should a nuclear conflict ever occur.

The Governor of Washington, the Honorable John Spellman, was of the opposite view—and the laws of Washington provide for a line-item veto. On February 23, 1984, Governor Spellman vetoed the language opposing attack preparedness. The Governor, in his veto message to the senate, stated: "The State of Washington is responsible for the protection of the lives and property of its citizens. This responsibility is expressed in our state and national constitutions and outlined in State and Federal laws. Although a nuclear attack would be a nightmare, one which would make all other calamities man had suffered seem small, State government is obligated to save as many lives as possible, and it is immoral to prevent government from doing all that it can to save lives and reduce suffering. The section I am vetoing would shackle the hands of State agencies in responding to the massive human suffering following an attack. Although there may be little that government can do, it cannot stand by and watch citizens suffer if there are state resources that can be used to provide them some relief.

"Although possible senarios for a nuclear war can be debated, the fact remains that no one can guarantee that our entire population will be lost in an attack. As long as any of our citizens remain alive, they are entitled to the protection and services of the State. If at all possible, food, water, relief for pain, and shelter must be provided to those in need." Attachment "B" provides a copy of Governor Spellman's letter for the subcommittee's record.

Quite apart from debates about whether it is or is not humanitarian to try to save lives against all hazards, there is the fact that if people perceive a threat to their lives or safety, they will move to an area they consider to be safer. We saw that at Three Mile Island, where 145,000 people left the area without any official advice to do so. Should an acute international crisis ever occur, public opinion polls indicate that people are going to leave U.S. cities by the millions. The only choice is, do we have some plans and preparations or do we not have them? The certainty of spontaneous movement is a strong argument for developing evacuation plans and capabilities, particularly when evacuation clearly will save lives in a variety of domestic disasters and hazards. It is essential as well, of course, to provide for protection for people where they live and work, for emergencies which do not demand or allow time for the option of evacuation.

President Kennedy termed civil defense preparedness as "insurance we trust will never be needed—but insurance which we could never forgive ourselves for foregoing in the event of catastrophe." This insurance rationale applies to domestic and national security emergencies alike.

This year we are spending for this insurance against disasters and emergencies about 75 cents for each man, woman, and child in this country. That is about one-fifth of a cent per day, or one cent every five days. I need not point out how little fire, automobile, or health insurance 75 cents will provide. In civil defense, it provides an organization, but only marginal capabilities to protect life in major emergencies.

The administration's fiscal year 1985 request for civil defense would raise this premium to about one dollar per capita, with additional moderate increases projected for the out-years. That's still the best insurance price I know of. The capabilities to be developed will be those required to save human life in emergencies of all types—as required by the Act and as enumerated in Title V, added by the Congress in 1980.

The elements are outlined in Attachment "A," outlining the highlights of the fiscal year 1985 request. In general they provide for improving warning, accelerating multi-hazard emergency planning to protect the population, and improving facilities and capabilities for direction of lifesaving operations by key local and State officials.

I would like to stress, in closing, the special need for more and better emergency management training for responsibile officials throughout the country and the need to modernize our antiquated Federal communications and warning systems. The need for training in emergency management as highlighted in a 1983 conference of elected officials at which my staff distributed a questionnaire dealing with emergency basics.

The questionnaire asked whether respondents knew the answers to such policy questions as who has authority to use schools as shelters, in a local emergency? Who can declare such an emergency, and what authority does this confer? Can private property be commandeered in an emergency and if so, who pays for such use? If a hospital needs to be evacated, who bears the cost of any liability which may result? Who can order an evacuation of the population, and in what circumstances? Who is in charge? (The full questionnaire appears at Attachment "C".)

While some responded well, the majority did not know the answers to critical questions which frequently arise in emergency operations. There is a crying need to reach policy-level local officials with training in these and related areas, and our fiscal year 1985 request will permit us to meet this need—in particular with our Emergency Management curriculum, providing scenario-based exercise courses which simulate a high-stress emergency environment.

We know we can do this job and do it well, because we have already given exercise-based training to the key officials of a number of jurisdictions at our Emmitsburg, Maryland, Emergency Management Institute. Participants in these courses have included the chief executives and their key officials of Arlington, Virginia, Alexandria, Virginia, Atlanta/Fulton County, Georgia; and Rhea, Meigs, and McMinn Counties, Tennessee.

The exercise, which forms a major part of the course, is tailored to the jurisdiction whose official is being trained. It is based on a simulated disaster of a type which has affected, or is likely to affect, their own jurisdiction.

In March, Mayor Tom Bradley of Los Angeles and eight of the City's department heads, along with 56 of their chief deputy assistants, participated in an emergency management course at Emmitsburg, with a full-day exercise based on heavy coastal storms in the Los Angeles Area, a severe hazardous materials accident, and a terrorist threat. Also in March, we put on a similar course on-site in New Orleans—with stress on helping them plan for the World's Fair. This month, we will be training Fort Worth officials at our Emmitsburg Facility, and providing on-site training for officials at San Francisco and Dallas.

Without exception, the elected and appointed officials who have participated in training of this type have told us that it will improve their ability to respond effectively when real emergencies occur. Our FY 1985 request, if approved, will allow us to meet the strong and growing demand for exercise-based training both at Emmitsburg and, increasingly, on-site at the jurisdictions.

The situation as regards telecommunications and warning is also critical. For example, radio communications between the States and FEMA Regional Offices use 1950's vintage equipment. The existing Federal warnings system depends almost completely on leased wired circuits and is outdated and vulnerable.

Our fiscal year 1985 request will provide for development of the National Emergency Management System (NEMS), integrating FEMA telecommunications, warning and information systems. Briefly, NEMS is to the civilian side of government what the National Military Command System is to the military. We will complete the replacement of mid-1950's radio equipment at the FEMA Regions and all States; start deployment of modern low-frequency radio and meteor burst radio warning system (including capabilities to activate warning receivers in, for example, an area threatened by tornadoes or flash floods); and make associated improvements to FEMA civil networks.

CONCLUSION

I believe that FEMA's fiscal year 1985 request for $252.478 million should be approved. Humanitarian concern for human life, Presidential directives, and the intent of the Congress expressed in the Civil Defense Act, including its recent amendments, all dictate that we provide improved capabilities to save lives in all emergencies.

Mr. Chairman, I would be pleased to respond to any questions that you and other subcommittee members may have.

[ATTACHMENT "A"]

HIGHLIGHTS OF FISCAL YEAR 1985 CIVIL DEFENSE BUDGET REQUEST

[Budget authority in millions of dollars]

Appropriation and program	Fiscal year—	
	1984 current estimate	1985 request
Emergency management planning and assistance:		
State and local emergency management	$56.800	$60.700
Radiological defense	10.300	20.000
Population protection	13.000	23.700
Protection of industrial capability	4.700	5.200
State and local direction, control and warning	19.043	31.300
Research	5.575	9.300
Training and education	15.425	18.800
Telecommunications and warning	15.242	49.900
Salaries and expenses	28.875	33.478
Totals	169.204	252.478

HIGHLIGHTS OF PROGRAM ACTIVITIES

As shown in the preceding table, FEMA's fiscal year 1985 request for civil defense activities totals $252.478 million. The fiscal year 1985 request continues and intensifies the emphasis on the Integrated Emergency Management System (IEMS), which is being initially deployed in fiscal year 1984. IEMS embodies a focus on the functions needed across the spectrum of potential emergencies. At the same time, IEMS provides for addressing the unique characteristics of individual hazards.

The intensified emphasis on IEMS reflects the strong recommendation of participants in the Summer 1983 reassessment of the civil defense program. About 100 Federal, State, and local personnel participated in this reassessment.

Outlined below are highlights of FEMA's fiscal year 1985 civil defense request, in the order in which elements appear in the budget justification.

1. State and local emergency management

A. Emergency Management Assistance.—This element provides matching funds to support the basic emergency management structure of some 1,300 State and 4,800 local professionals in some 2,500 jurisdictions. The fiscal year 1985 request will allow some increase in population coverage at the local level.

B. Other State and Local Emergency Management.—This includes funding for Individual Mobilization Augmentees (IMA's), military reservists who assist State and local as well as FEMA offices in preparedness activities and during emergency operations. The fiscal year 1985 request will allow an increase from approximately 1,000 reservists in fiscal year 1984 to an estimated 1,300 in fiscal year 1985.

2. Radiological defense

A. Planning and Development.—The fiscal year 1985 budget will provide funding for 52 full-time Radiological Defense Officers (RDO's) now on board, plus approximately 52 Assistant RDO's for State operations staffs. The role of the RDO includes preparations for all types of emergencies resulting in radiological hazards (such as transportation accidents involving radioactive materials, nuclear power plant accidents, attack).

B. Instrumentation.—The fiscal year 1985 request provides for continued pilot production of newly developed instruments, and for initial private-sector production and FEMA procurement of dosimeters, providing a basis for quantity procurement in fiscal year 1986 and beyond. It also provides for continuing maintenance and calibration of over 4.2 million radiological instruments procured in the 1960's and distributed to the States, as well as for intensified development of a low cost ratemeter for the full spectrum of radiological emergencies.

3. Population protection

A. Population Protection Planning.—This element, which through fiscal year 1983 emphasized planning to protect the population from nuclear attack effects by crisis evacuation, has been broadened to include multiple-hazard planning at State and local level, including natural and technological as well as attack hazards. State planners will assist localities to develop plans to protect the population from all hazards determined by vulnerability analyses to be potential threats to each specific locality.

Plans will provide for protecting populations by options for evacuation and in-place sheltering, depending on the nature of the threat and the time available for protective operations. Plans will be generic in nature, addressing the functions needed across the spectrum of potential local emergencies. These plans will address, for example, warning for the public, direction and control of operations by local officials, traffic control, hazard monitoring and analysis, and emergency information and advice for the public ("where to go and what to do" in event of various types of emergencies). The fiscal year 1985 request provides for 170 State planners in addition to the 205 now on board, to accelerate development of multiple-hazard plans for population protection.

B. Facility Survey, Engineering and Development.—This element will build upon the previous National Shelter Survey (which will be essentially completed at the end of 1984). It is being expanded to identify facilities required to protect people from natural and technological hazards which may affect a local jurisdiction. All-hazards surveys will be initiated on an accelerated basis to support population protection planning. In addition, the program will define feasible and cost-effective options to address shelter development in communities where shelter deficits exist.

C. Shelter Preparations.—The thrust of this element will be to refine and initiate a shelter marking effort as well as to commence development of shelter life support systems (e.g., ventilation, water, food, medical supplies, sanitation). We will investigate life support system options to utilize existing community and national resources and to define the degree to which specialized stocks are needed to supplement those assets.

4. Protection of industrial capability

The fiscal year 1985 request provides for refining key-worker emergency shelter designs, to reduce costs, and for testing shelters; for assisting and encouraging industries to develop multiple-hazard protection plans using FEMA planning guides; and for continuing research and countermeasures and strategies to enhance to survivability of industry.

5. State and local direction, control and warning

The fiscal year 1985 request provides for continuing (a) the development of State and local emergency operating centers (EOC's, essential for control of operations by key local and State officials in all types of emergencies); (b) development of survivable State and local warning and communications systems, with a national goal of reducing reliance on land lines, (c) adequate funding for repair, maintenance, and replacement of existing EOC and communications and warning system components, and for recurring utility costs for emergency systems; (d) protection of broadcast station (to provide a means for transmitting information and advice to the public in emergencies of all types); (e) the upgrade of the quality and effectiveness of State and local Emergency Broadcast System operational area plans; and (f) electromagnetic pulse protection for broadcast stations and EOC's.

6. Research

Research provides the technical and scientific base for the Integrated Emergency Management System.

7. Training and education

The overall thrust of FEMA's civil defense training program is to improve the ability of States and local communities to deal with emergencies and disasters of all types. The program includes curricula and courses for policy-level officials, emergency management professionals, governments' emergency services, business and industry, and the public.

The fiscal year 1985 request will support civil defense skills training for emergency services personnel and citizen volunteers in a variety of areas, including radiological defense and shelter management. It will also emphasize real-time, scenario-based exercise courses for public officials to simulate a high-stress emergency environment.

8. Telecommunications and warning

The major emphases of the fiscal year 1985 request are to (a) commence deployment of a survivable, low-frequency and meteor burst radio warning system; (b) acquire mini-computer regional switches which will provide a secure network capability; (c) replace mid-1950's vintage radio equipment at all FEMA Regional locations with modern high-frequency equipment; (d) replace radio equipment at all State locations with modern equipment; and (e) provide a Private Automatic Branch Exchange (PABX) for the FEMA Headquarters, each Region and Federal Regional Centers. These improvements are essential to deployment of the National Emergency Management System (NEMS), providing for reliable, survivable communications across the spectrum of potential emergencies and disasters. NEMS is an integral and critical element of the Integrated Emergency Management System.

SALARIES AND EXPENSES

The salaries and expenses appropriation provides for the staff required to develop, implement, and manage the civil defense program (703 work years). It also includes $2.181 million for Automatic Data Processing Support Services, including $1.199 million for the civil defense share of the lease costs for equipment that was acquired in January 1984.

SUMMARY OF FISCAL YEAR 1985 REQUEST

The fiscal year 1985 request reflects full deployment of the Integrated Emergency Management System. With its increased flexibility and its stress on building capabilities to respond to all types of emergency, IEMS strengthens the Federal State-local partnership specified by the Congress in the Federal Civil Defense Act.

This partnership is reflected in the fact that of the total fiscal year 1985 request, approximately 53 percent of the dollars are provided to State and local governments in the form of grant funds and equipment and services. The balance of the request also supports State and local emergency management by providing such overall infrastructure elements as an integrated national telecommunications system serving FEMA and the States. It also supports training activity at the Emergency Management Institute at Emmitsburg, Maryland, at a new National Emergency Training Center-West, and in the Regions and States.

[ATTACHMENT "B"]

STATE OF WASHINGTON,
February 23, 1984.

To The Honorable, the Senate of the State of Washington.

LADIES AND GENTLEMEN: I am returning herewith, without my approval as to one section Substitute Senate bill No. 4561, entitled: "An act relating to emergency management."

Subsection 3 of section 3 obstensibly is intended as a broad policy statement in opposition to planning for emergency response in the event of nuclear attack. Unfortunately, as drafted, the subsection could be construed to prohibit the use of emergency management functions in response to a nuclear attack as distinct from merely planning for one.

The state of Washington is responsible for the protection of the lives and property of its citizens. This responsibility is expressed in our State and National Constitutions and outlined in State and Federal laws. Although a nuclear attack would be a nightmare, one which would make all other calamities man has suffered seem small, State government is obligated to save as many lives as possible, and it is immoral to prevent government from doing all that it can to save lives and reduce suffering. The section which I am vetoing would shackle the hands of State agencies in responding to the massive human suffering following an attack. Although there may be little that government can do, it cannot stand by and watch citizens suffer if there are State resources that can be used to provide them some relief.

Although possible scenarios for a nuclear war can be debated, the fact remains that no one can guarantee that our entire population will be lost in an attack. As long as any of our citizens remain alive, they are entitled to the protection and services of the State. If at all possible, food, water, relief from pain, and shelter must be provided to those in need.

Therefore, I have vetoed section 3(3). The remainder of Substitute Senate bill No. 4561 is approved.

Respectfully submitted,

JOHN SPELLMAN, *Governor.*

Attachment "C"

DISASTER PREPAREDNESS POLICY CHECKLIST FOR ELECTED OFFICIALS

Federal Emergency Management Agency

ARE YOU PREPARED:

Following are some important policy issues which key elected officials have had to face in a local disaster or emergency. Can you answer "Yes" to each of these?

DO YOU KNOW...?	Yes	No
Evacuation		
Who orders an evacuation?	____	____
What circumstances warrant evacuation?	____	____
Who is in charge of an evacuation?	____	____
Where are evacuees taken?	____	____
How are they transported?	____	____
Can we forcibly evacuate?	____	____
What is the policy on evacuation of pets?	____	____
What is the policy for looters?	____	____
What is the shelter management system?	____	____
Emergency		
Who declares a local emergency?	____	____
What authority does a declaration of emergency give policy makers?	____	____
Are liability questions addressed by a declaration of emergency?	____	____
Are our emergency actions legal?	____	____
Information		
Do we have reliable information upon which to base public policy?	____	____
Do we have a policy on how information is to be communicated to the public?	____	____
What information does the public need?	____	____
Medical		
Who orders medical personnel into the field?	____	____
Are there medical personnel who will respond to such an order?	____	____
If a hospital needs to be evacuated, who bears the cost?	____	____
Who receives the evacuees?	____	____
Who is responsible for liability if a patient dies during transport?	____	____

Attachment "C" Continued

	Yes	No
How long does it take to evacuate a hospital?	____	____
If there is a hazard to the health and/or lives of hospital personnel (i.e., a hazardous airborne substance) what is the policy regarding both patients and personnel?	____	____
Who releases casualty information?	____	____
Who is responsible for emergency medical aid?	____	____
Public Safety		
Is there a policy for handling terrorist activities?	____	____
What is our responsibility toward hostages?	____	____
Do we accommodate the demands of terrorists to secure the release of hostages?	____	____
During a civil disobedience, do we negotiate with leaders of the unrest or do we arrest them?	____	____
If snipers are shooting at firefighters, do we let the area burn?	____	____
Who is responsible for law and order?	____	____
Private Property		
Can private property be commandeered during an emergency?	____	____
Who pays for private sector resources if utilized during an emergency?	____	____
Can we destroy private property during an emergency?	____	____
In what circumstances?	____	____
Who orders the use or destruction of private property?	____	____
Records		
Who is responsible for documentation of actions, costs, etc., as proof for later claims for reimbursement?	____	____
How will we make sure that all the necessary information is brought together in one place?	____	____
Schools as Shelters		
Who has the authority to utilize schools as shelters?	____	____
Who has the authority to order the use of school buses?	____	____
Who is in charge of shelters in schools?	____	____
Who is responsible for costs or liabilities incurred from such use of schools?	____	____

IMPACT OF HOUSE ARMED SERVICES REDUCTION

Senator WARNER. Thank you, Mr. Giuffrida.

I believe we have some questions.

What impact will the reduction by the House Armed Services Committee have?

This might be addressed by both of you gentlemen.

Mr. GIUFFRIDA. Obviously, the amount of money we requested, the $252,478,000 at the time we requested it was our most, I think, unfrilled estimate that we could come up with, consistent with meeting the needs to modernize the communications, the warning systems, to train the people, to provide the kind of predictable, effective and coordinated, as well as acceptable response that I feel we are obligated to provide.

A reduction in what we perceived as a baseline number to the level that the House took us would force us to abandon many of the things that we consider essential.

We are currently involved in FEMA in addressing that issue to see how we can salvage it. We can't even stand still at that number and do all the things we are doing now. If that is the number we wind up with, I think it would be unfortunate.

POPULATION PROTECTION PLANNERS

Senator WARNER. Are the 170 additional State planners included in the fiscal year 1985 request intended to be used in the areas identified as higher risk to nuclear attack?

Mr. GIUFFRIDA. Some of them will be, yes, sir.

Actually we are increasing the number of planners. That number shows they are not equally divided among all the States.

The first consideration was major population areas, some of which include counterforce areas. But the overall thrust of it is to do what the Congress told us to do and that is to make better identification with the State and local governments of what they perceive as their greatest areas of hazard and to help them fill the gaps they have, such as the absence of plans.

WARNING SYSTEM REQUIREMENTS

Senator WARNER. A significant growth item in your request is the national warning system.

Will you comment on the characteristics of this system's requirements and especially with respect to nuclear attack scenarios?

Mr. GIUFFRIDA. Mr. Chairman, I will provide, with your approval, a detailed answer on that for the record.

The answer to your question is that the system is antiquated. Some of the people we have are working with antiquated communications gear.

You face the same thing when you address the defense budget; you have young pilots flying B-52's that are 15 years older than the pilots are.

Much of our equipment in communications is from the fifties. So the whole system needs to be updated and we are trying, within our ability, to make it so that it functions.

[The information follows:]

NATIONAL WARNING SYSTEM

The current National Warning System [NAWAS] is a vulnerable leased landline system. Under nuclear attack, it could be eliminated. With a regional attack or terrorist/sabotage incident, a portion or portions of the NAWAS could be disabled.

The NAWAS is a nationwide leased, dedicated voice warning network. Its primary purpose is to provide the American population with information of an impending attack upon the United States. It is also used extensively to provide warning of natural disaster, severe weather, sea wave warning, and downed aircraft incidents. NAWAS information is furnished to State governments, cities, counties and various Federal and military agencies. These points disseminate the warning information to the population by various local systems.

In 1985, FEMA will initiate the phased upgrade of existing landline systems into a more surviviable infrastructure by using the techniques of low frequency broadcast and meteor burst communications. Existing warning systems, which are almost totally dependent on leased landlines, are outdated and vulnerable in current potential crisis scenarios.

This initiative is a much needed effort to consolidate and update NAWAS into one cohesive and survivable system to provide broader and more efficient warning coverage. If the necessary funding is provided, the proposed system would begin implementation in 1985 and would be fully operational in 1987. It would maintain an acceptable level of survivability over an extended period of time by using both low frequency and meteor burst technology, resource distribution, redundancy, mobility, dispersion, deception, responsive system control, reconstitution, and electromagnetic pulse protection.

The 1985 request for the low frequency primary warning is to initiate procurement covering the northeast sector that includes FEMA national, three regions and 16 remote relays. Low frequency stations will operate continuously. The primary advantage of this system is that low frequency transmissions can be broadcast over a wide area directly to dispersed receiving equipment.

The 1985 request for the meteor burst backup warning system is to initiate procurement comprising master stations at 14 locations throughout the continental United States, one remote relay location, transceivers at each State, and receivers at warning points. All warning operation within the subsystem will be automated to the greatest extent possible. Teletypewriter warning messages sent from the National Warning Center or the Alternate National Warning Center, respectively, by line of sight radio to region or FEMA national will be automatically retransmitted to all master stations. After each master station receives the warning and automatically acknowledges its receipt, the teletypewriter warning message will be automatically broadcast to warning points in its area of responsibility.

IMPACT OF FISCAL YEAR 1984 REDUCTIONS

Senator **WARNER**. Last year the request for civil defense was, comparable to this year's request, reduced by $80 million.

Will you comment on what you were unable to accomplish as a result of last year's action by Congress.

Mr. **GIUFFRIDA**. Again, with your approval, a detailed answer to that will be provided for the record.

What we did was less of the training, we did less of the assistance to State and local governments to build emergency operating centers.

We did less than we wanted to do in communications. We were forced to do less than we had planned to do with matching some of the costs of the State and local level, both operating costs and salary cost.

[The information follows:]

In general, the $169 million appropriated for the civil defense program in fiscal year 1984 allowed about 8 to 10 percent real growth, whereas the $253 million requested would have allowed about 70 percent growth.

The fiscal year 1984 appropriation level thus precluded a meaningful start on the improved program recommended by the administration and mandated by the Congress in the 1980 amendments to the Civil Defense Act (adding a new Title V, specifying an "Improved Civil Defense Program" and the elements thereof). The fiscal year 1984 appropriation level also signalled to State and local governments that the Federal Government was not seriously concerned to improve readiness, throughout the country, for emergencies of all types.

Examples of what FEMA is unable to accomplish in fiscal year 1984, as a result of action by the Congress on the request, include the following:

(1) Emergency Planning.—No acceleration is possible in development of local multiple-hazard emergency plans. (Pursuant to the Integrated Emergency Management System, or IEMS, local plans address all hazards likely to affect a given locality, starting in fiscal year 1984. Previously, plans primarily addressed attack hazards only.)

The State-level force of professional planners is being held to a ceiling of 205 (subject to some erosion by reason of fiscal year 1983-1984 inflation). FEMA estimates that it will take this force of planners well over a decade to assist local governments to complete multiple-hazard emergency plans—by which time the earlier plans will be badly out of date.

(2) Emergency Operating Centers.—FEMA is able to meet only a small percentage of the need for matching funds to assist State and local governments to develop Emergency Operating Centers (EOC's), essential for directing lifesaving operations in emergencies of all types. The $10.6 million available for EOC's is about one-quarter of the requirement of $40 million reported by State and local governments.

(3) Federal Telecommunications and Warning.—The $15.2 million appropriated allows only a fractional start to be made on replacement of antiquated, 1950's-vintage radio equipment at Regional and State offices. It allows no start at all to be made on procurement of a radio warning system to replace the current outdated and vulnerable land-line warning system, also dating from the 1950's. It is specially critical to move as rapidly as possible from land-line systems to radio because of the large tariff increases anticipated for land-lines, due to AT&T divestiture. These increasing charges must be paid each year and every year for as long as the land-line system exists. A radio warning system, by contrast, involves a one-time capital expenditure for the equipment, with no tariffs or charges required for use of the radio system.

The "bottom line" is that an annual investment of 75 cents per capita simply cannot purchase much protection for the American people against major disasters. No other nation of consequence does so little for its people.

DEPARTMENT OF DEFENSE TESTIMONY

Senator **Warner**. Thank you. If you would care to depart——

Mr. **Giuffrida**. With you approval, I will leave in 10 minutes.

Senator **Warner**. General Stilwell, we welcome you again this year as in the years past.

You are recognized by this committee as an expert in your field. Senator Goldwater was here earlier and expressed his regret he had to chair another committee hearing and was unable to be present.

STATEMENT OF GEN. RICHARD G. STILWELL, U.S. ARMY (RETIRED), DEPUTY UNDER SECRETARY OF DEFENSE FOR POLICY, DEPARTMENT OF DEFENSE

General **Stilwell**. Thank you, Mr. Chairman.

I indeed appreciate this opportunity to testify on behalf of the Federal Emergency Management Agency's proposed civil defense program for the upcoming fiscal year and to assure you that it has the Department of Defense's full endorsement and support.

With your permission, I will simply summarize my prepared statement.

DOD OVERSIGHT REPORT

As you are aware, the Department of Defense and the National Security Council share responsibility for oversight of FEMA's civil defense efforts. That responsibility derives in part from a mandate we received from the Senate Armed Services Committee several years ago to ensure:

That civil defense planning continues to be fully compatible with the Nation's overall strategic policy, and

That legitimate needs of national security not be unintentionally subordinated to disaster relief in programming.

In compliance with the mandate, we have for the past 5 years provided for your committee's consideration, a written assessment of FEMA's proposed program, together with an analysis of the data upon which our assessment is based.

At this time, I respectfully request that our report on the fiscal year 1985 program proposal, submitted on the 16th of February, be entered into the record of this hearing.

As Secretary Weinberger stated in this report, and I quote his words:

> I am pleased to state that the program provided for in the proposed fiscal year 1985 budget fully supports and is consistent with the civil defense policy guidelines prescribed by the President.

NEED FOR FISCAL YEAR 1985 IMPROVEMENT

Two years ago, when testifying before this committee in support of FEMA's fiscal year 1983 budget authorization request, we noted that a Presidential decision had been made to increase the resources devoted to civil defense, to expand the program on a nationwide basis, and to lay the groundwork for repairing crucial deficiencies in previous approaches to protecting our Nation against nuclear attack.

Congress did not authorize that increased funding. So, we now approach you with the optimism that on this third try for enhancement of a vitally needed national effort, we will succeed.

What was proposed in fiscal year 1983 and again last year and what is being proposed now is a program that will, we believe, lessen the likelihood of nuclear war by giving the American people a much better chance of surviving a nuclear attack than they presently enjoy.

Even in the face of severe budget constraints and extraordinary conceptual challenges, a responsible government can attempt no less for the people it serves.

All of us are well aware that the most fundamental purpose in the administration's strategic modernization and arms control initiatives is the prevention of war, particularly nuclear war.

All elements of our five-point strategic modernization program, which you know so well, including civil defense, bear upon this. However, civil defense gains a new perspective in the mid-1980's as the National Government as a whole seeks to lead the Nation in achieving preparedness for emergency mobilization.

I emphasize the word "preparedness." Neither we in the Department of Defense nor any other agency of Government are seeking to mobilize now for any known or foreseen emergencies; but we are giving realistic attention to the deterrent value of a credible, demonstrable capability to mobilize when and if necessary.

At this hearing last year we had an interesting discussion of the essence of the present strategic modernization program; to wit, the attainment of a posture which convinces the Soviets that we have the capacity to absorb a hypothetical strike and still have the residual capability under control to put at risk an unacceptable portion of their political and military command structure and forces, thereby eliminating any Soviet incentive for a first strike.

To attain this capability, the President's program emphasizes prompt retaliatory hard-target kill, improvements in command, control and communications, and survivable and enduring forces, all as elements of a credible retaliatory capability to respond.

Yet our strategic program also seeks to limit to the extent we can—through improvements in our defense—the damage that we would suffer from a Soviet nuclear attack.

The strategic program, therefore, emphasizes improvements in air defense, in our ability to sustain Government continuity—particularly at State and local levels--after an enemy attack, and in our ability to mitigate the effects of such an attack upon the fabric of our society.

Therefore, while an improved nationwide civil defense program is an integral part of an overall strategic posture, it also is simply a collection of technologies and management techniques for the purpose of saving lives under peacetime and wartime conditions.

STRATEGIC ROLE OF CIVIL DEFENSE

Civil defense, in conjunction with other improvements in our strategic posture, should help sustain the view that the United States intends to maintain a capability to deny the Soviets any meaningful gains from the threatened or actual use of nuclear weapons.

If we are able to demonstrate such a capability and resolve, the Soviets should recognize the futility of their continuing efforts to achieve strategic superiority. When they do, the prospect for negotiating realistic arms control measures will be improved.

Senator **Warner**. I want to interrupt you on that point having looked through your statement prior to this hearing.

I think that is the benchmark.

General **Stilwell**. Thank you, sir.

The Department of Defense considers the proposed civil defense improvement program as one important part of our national policy of deterring nuclear war.

We view the fiscal year 1985 civil defense program as an effective application of constrained resources to the FEMA mission.

We also view the proposed program as the scope and level of commitment that is essential for civil defense at this time.

In summary, Mr. Chairman, we in DOD believe that timely implementation of the several improvements encompassed in the President's strategic modernization program offers the best hope of restoring and maintaining the strategic balance that will dispel any illusions that nuclear war will produce meaningful gains.

We also believe that the all-hazard emphasis of FEMA's civil defense program, IEMS, enhances national security by building a capability to protect our Nation and assure our ability to continue our essential actions in the face of any calamity, natural or otherwise.

This is what the President's civil defense policy requires. For that reason, sir, we urge support of this submission.

[The prepared statement of General Stilwell follows:]

PREPARED STATEMENT OF RICHARD G. STILWELL, GENERAL, U.S. ARMY (RETIRED), DEPUTY UNDER SECRETARY OF DEFENSE FOR POLICY, DEPARTMENT OF DEFENSE

Mr. Chairman, members of the committee. I appreciate this opportunity to testify on behalf of the Federal Emergency Management Agency's proposed Civil Defense Program for fiscal year 1985, and to assure you that it has the Defense Department's full endorsement and support.

As you are aware, the Department of Defense and the National Security Council share responsibility for oversight of FEMA's Civil Defense efforts. That responsibility derives in part from a mandate we received from the Senate Armed Services Committee several years ago to insure:

That Civil Defense planning continues to be fully compatible with the Nation's overall strategic policy, and

That legitimate needs of national security not be unintentionally subordinated to disaster relief in programming.

In compliance with this mandate, we have for the past five years provided for your committee's consideration, a written assessment of FEMA's proposed program, together with an analysis of the data upon which our assessment is based.

At this time, I respectfully request that our report on the fiscal year 1985 program proposal, submitted on the 16th of February, be entered into the record of this hearing.

As Secretary Weinberger stated in this report—and I quote his words—I am pleased to state that the program provided for in the proposed fiscal year 1985 budget fully supports and is consistent with the Civil Defense policy guidelines prescribed by the President".

Two years ago, when testifying before this committee in support of FEMA's fiscal year 1983 budget authorization request, we noted that a Presidential decision had been made to increase the resources devoted to Civil Defense, to expand the program on a nationwide basis, and to lay the groundwork for repairing crucial deficiencies in previous approaches to protecting our nation against nuclear attack. We in Defense took part in that decision, and had hoped that FEMA would be able to launch this revitalized effort in fiscal year 1983.

Unfortunately, this was not possible for the reasons outlined in my testimony last year.

In reality, what was proposed then—and what is being proposed now—is a program that will, we believe, lessen the likelihood of nuclear war by giving the American people a much better chance of surviving a nuclear attack than they presently enjoy. Even in the face of severe budget constraints and extraordinary conceptual challenges, a responsible government can attempt no less for the people it serves.

I need not remind the members of this committee that, while the role of the Department of Defense is to cope with war, should it be visited upon us, its purpose is to contribute to the preservation of peace. All of us are well aware that the most fundamental purpose of the administration's strategic force modernization and arms control initiatives is the prevention of war, particularly nuclear war.

We continue to believe that our ability to deter war will be strengthened if we can convince the Soviet leadership that an attack on the United States or its allies would yield no meaningful advantage. We believe that it is possible to convince the Soviets of this by demonstrating that we have the resolve to deny them their objectives whatever military option they may elect to pursue.

As I discussed last year and will summarize today, all elements of our five point strategic modernization program—including Civil Defense—bear upon this. However, Civil Defense gains a new perspective in the mid-1980s as the National Government as a whole seeks to lead the Nation in achieving preparedness for emergency mobilization. I emphasize the word "preparedness". Neither we in the Defense Department nor any other agency of the Government are seeking to mobilize now for any known or foreseen emergency; but we are giving realistic attention to the deterrent value of a credible, demonstrable capability to mobilize if necessary.

Through the efforts of the White House-chaired Emergency Mobilization Preparedness Board, the Defense Department has cooperated in a fruitful Government-wide effort to define and coordinate those measures essential for the Nation to mobilize rapidly and effectively if world conditions necessitate that drastic action. In this context, no responsible Government can overlook the possibility, however remote it may be, that a viable and responsive Civil Defense Program could be an essential element of an emergency mobilization. While funding for such a program obviously must share with other defensive measures the burdens of constrained national resources, mobilization preparedness demands that the Civil Defense Program be effective for our nation, credible to our potential enemies, and dynamic in meeting change.

Our Strategic Modernization Program specifically recognizes that a Soviet nuclear attack is possible. The program therefore seeks to assure our ability to retaliate effectively and in a manner appropriate to the nature of the Soviet attack. To attain this capacity, the President's program emphasizes prompt retaliatory hard-target kill; improvements in command, control, and communications; and survivable and enduring forces—all as elements of a credible capability to respond.

Yet our strategic program also seeks to limit to the extent we can—through improvements in our defense--the damage that we would suffer from a Soviet nuclear attack. The strategic program therefore emphasizes improvements in air defense, in our ability to sustain government continuity—particularly at state and local levels—after an enemy attack, and in our ability to mitigate the effects of such an attack upon the fabric of our society.

Therefore, while an improved nationwide Civil Defense Program is an integral part of an overall strategic posture, it also is simply a collection of technologies and management techniques for the purpose of saving lives under peacetime and wartime conditions. As a peacetime capability, its usefulness in disaster relief is obvious. As a wartime capability for reducing population density in potential target areas and facilitating survival and reconstitution in all areas, it complements our military efforts to make war less likely.

Some people argue that improved Civil Defense actually increases the likelihood of nuclear war by providing a false sense of security. No one who knows anything about the effects of modern nuclear weaponry can seriously believe that. One has only to look closely at what the proposed Civil Defense Program entails to dispel any notion that it would eliminate vulnerability to the effects of nuclear war.

Even the most massive Civil Defense effort would not provide such security. And, as is evident, the proposed program is a modest, rather than massive, effort. Its aim, in conjunction with other improvements in our strategic posture, is to sustain the Soviet perception that the United States intends to maintain a capability to deny them any meaningful gain from the threatened or actual use of nuclear weapons.

If we are able to demonstrate such capability and resolve, the Soviets should recognize the futility of their continuing efforts to achieve strategic superiority. When they do, the prospects for negotiating realistic arms control measures will be improved.

This administration received a mandate from the American people to improve our nation's defenses, and to redress the effects of years of neglect. The Defense Department considers the proposed Civil Defense improvement program an important part of our national response to that mandate.

It is a program designed to realize the advantages of previous and continuing research in population protection measures, while eliminating the deficiencies of earlier proposals.

It is a program that recognizes that preparedness for effective response to natural calamities such as earthquakes, hurricanes or floods—and to manmade calamities such as chemical or nuclear accidents or terrorism—also contributes to preparedness for the greatest potential calamity of all, nuclear war.

It is a program that acknowledges that disaster remains disaster, whatever its magnitude or cause, that human suffering remains suffering, whatever its source; and that social responsibility requires us—as a government and as a nation—to do what we can to prevent or mitigate disaster and suffering, however limited our capabilities may be, rather than succumb to a paralysis of despair.

The fiscal year 1985 Civil Defense Program will continue to mold to current needs a cooperative partnership of federal, state and local governments that has existed since World War II. The partnership, which is essential to enable communities throughout our land to do a better job of coping should disaster strike, is being enhanced by FEMA's development of the Integrated Emergency Management System. Implementation of that system on a nationwide basis is sought through the funding increase requested for 1985.

The Defense Department views the aggregate proposed funding increase, and the program realignments, in the fiscal year 1985 Civil Defense Program as an effective application of constrained resources to the FEMA mission. We also view the proposed fiscal year 1985 program as the scope and level of commitment that is essential for Civil Defense at this time.

In sum, we in the Defense Department believe that timely implementation of the several improvements encompassed in the President's strategic modernization program offers the best hope of restoring and maintaining a strategic balance that will dispel any Soviet illusions that nuclear war could produce any meaningful gain. We also believe that the all-hazards emphasis of FEMA's Civil Defense Program enhances U.S. national security by building a capability to protect our nation and assure our ability to continue our essential actions in the face of any calamity.

That is what the President's Civil Defense Policy requires.

For that reason, Mr. Chairman, we urge you to support this submission.

FEMA ROLE IN AREA OF TERRORISM

Senator **Warner**. Thank you, General. Thank you for providing a contribution to this subject.

Before concluding, gentlemen, I think the three of us join in recognizing the essential support that you receive from a very large volunteer organization throughout the United States.

Were it not for this contribution by thousands of individuals, this whole program would be far more expensive to the American taxpayer and probably far less effective.

To both witnesses, I would like to pose a question.

In view of the President's initiative, and I certainly commend the President for the initiative in the area of responding to acts of terrorism, what role has been given to your department?

Mr. **Giuffrida**. Yes, sir. FEMA has the responsibility to coordinate the Federal response to those acts of terrorism which would have catastrophic consequences or which would cause a major disruption of the community.

We have the same responsibility, as you know, in our radiological emergency preparedness plans around the power facilities, the nuclear facilities. We have, for the past 3 years, been working very diligently with the Defense Department, with NRC, and DNA, and others in this whole area of identifying how we would respond from FEMA's point of view.

We have no interest in tracking terrorists, nor in collecting intelligence, nor keeping dossiers on people. There are other agencies that are far better suited and have a legal mission to do that.

We are legitimate consumers of that intelligence and we get it on a regular basis. FEMA has no intention to have a hostage-negotiating or hostage-rescuing ability. Again, the Defense Department and FBI have that well in hand.

But we do have now a Federal system that is being addressed not only in FEMA and in the Defense Department, but also being tested in classes and exercises.

In fact, yesterday, FEMA completed a terrorism seminar from a local perspective. We took the 12 major metropolitan areas in the United States and invited them to send police chiefs, fire chiefs, elected officials. They all came with a party of four people.

They represented such cities as San Francisco, Boston, New York, Dallas, and so on. We brought over from England, from Israel, from West Germany, and from other countries that have a more continuing exposure to this kind of requirement, the heads of their departments.

Presentations from the Defense Department panels were very well received. We are doing this on a regular basis. I see no problem.

I think that between DOD and FEMA and the FBI, we have now worked out who would be doing what. From FEMA's point of view, it really becomes a matter if it gets out of hand and has a potential to become a disaster and an emergency, we set in motion this system, which you are already familiar with, dealing with whatever is threatening the community.

Senator **Warner**. General, do we have present this morning any representatives of the State directors?

General **Stilwell**. I don't see any here. I think they are on your schedule for later on, Mr. Chairman.

Senator **Warner**. If there is anyone here, would they please identify themselves for the purpose of the record.

[No response.]

Thank you very much, gentlemen.

Mr. **Giuffrida**. Thank you, Mr. Chairman.

[Questions submitted by members of the Armed Services Strategic and Theater Nuclear Forces Subcommittee follow:]

QUESTION SUBMITTED BY SENATOR JOHN W. WARNER

TERRORISM

Senator **Warner**. General Stilwell, would you elaborate on FEMA's role in responding to acts of terrorism?

General **Stilwell**. FEMA's role is one of coordinating the response by other Federal agencies and the Cabinet Departments to any large scale consequences of a terrorist act. FEMA does not have a role in the police or military type response to the terrorists themselves. However, it plans for a contingency in which the capabilities of many Federal resources might be required to assist state and local governments in mitigating the consequences and restoring the status quo following a single act or several coordinated acts of terrorism. For example, FEMA now is developing a plan for responding to consequences of acts that might occur in connection with special events of national significance. FEMA's role in that planning is parallel to its role for coordinating Federal response to catastrophic natural disasters.

QUESTION SUBMITTED BY SENATOR STROM THURMOND

SOVIET TARGETING

Senator **Thurmond**. General Stilwell and Mr. Giuffrida, it is a pleasure to have you here today to receive your testimony concerning our civil defense program.

Each year the Congress has cut the President's request for civil defense expenditures because there is a perception that we cannot protect ourselves, so why try?

This was accepted when we followed a strategy of mutual assured destruction.

Our targeting strategy has changed greatly since this policy was espoused more than twenty years ago.

As I understand it, our retaliatory forces have been the primary target for some time.

Is this true, General Stilwell?

General **Stilwell**. Our retaliatory forces, the command and control centers of our military forces and our national leadership must be assumed to be primary targets for planned attacks on the United States.

CONTRIBUTION TO STABILITY

Senator **Thurmond**. Then in a crisis situation, would a good civil defense plan add to stability?

General **Stilwell**. Yes, civil defense capabilities will add to stability in any crisis. By enhancing survivability of the civil government infrastructure and the population, civil defense contributes to our military capability to survive an attack and to retaliate. Our capability for military operations independent of continuing support from the civil sector is significant; but its durability is enhanced by every measure of civil survivability. In viewing today's U.S. strategic defense program, any enemy must recognize that even a surprise attack cannot eliminate all retaliatory consequences. However, with a viable, in-place civil defense program, the total U.S. capability to respond to a direct or implied threat of attack will increase geometrically as warning time is extended. The capability of our civilian leadership to negotiate a peaceful solution to a major crisis is directly enhanced by the effectiveness of our prior commitment to both military retaliatory capabilities and civil survivability.

The key relationship between civil defense capabilities and stability in a crisis is whether perceived or actual disparities between the Soviet and U.S. capabilities to survive an attack could lead the Soviet Union to attack. For example, we have said we would not evacuate unless the Soviets began to do so; therefore, it remains the Soviet capability for evacuation (and other passive defense measures), given the absence of a comparable U.S. capability for passive protection, that is destabilizing.

SPENDING PRIORITIES

Senator THURMOND. Each year we cut the program, but the Department of Defense makes little or no effort to maintain funding. General Stilwell, what is the priority for civil defense spending?

General STILWELL. Civil Defense is costly, and United States priorities for civil defense spending have been low by comparison of our per capita expenditures with the far greater expenditures of most nations in the Free World. The priorities for Civil Defense spending are addressed in FEMA's proposed budget as a balance of cost-effective programs against severely constrained resources. Yet the Congress repeatedly has refused to adopt even that proposed level of funding. More—much more—needs to be done in civil defense, particularly in terms of command and control communications capabilities, sheltering for critical elements, and education and training of leaders down to local community levels. Most that needs to be done also requires deliberate and sustained improvement over many years. Yet, continued funding at the level authorized by the Congress since 1982 only provides for a sustaining program and leaves many real national priorities with inadequate attention. We consistently note in DOD testimony before both Houses the real need for congressional commitment to a defined long-term national policy of supporting civil defense as one element of the Nation's strategic defense program. We will continue that course in the belief that the funding of a dynamic civil defense program will be a significant national defense priority for the foreseeable future.

Senator WARNER. The subcommittee is adjourned.

[Whereupon, at 11:14 a.m., the subcommittee adjourned, subject to the call of the Chair.]

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